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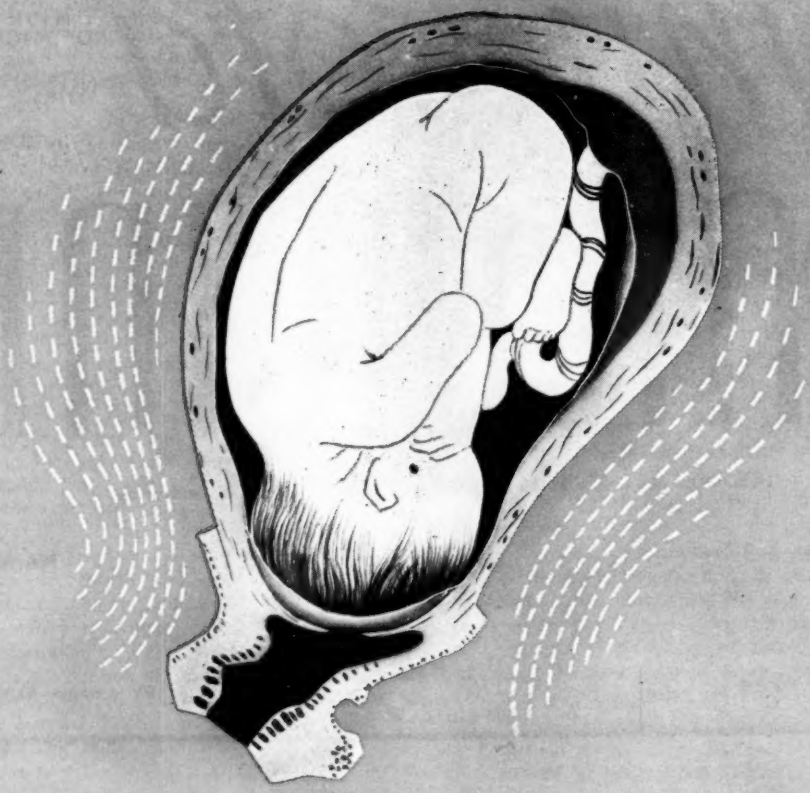

produces contractions

"clinically identical to normal, strong, physiological labor"

Minnesota Medicine

Journal of the Minnesota State Medical Association, Southern Minnesota Medical Association, Northern Minnesota Medical Association, Minnesota Academy of Medicine and Minneapolis Surgical Society

Volume 37 **October, 1954** **Number 10**

Contents

The Dignity of Medicine
Justus Ohage, M.D., Saint Paul, Minnesota 697

Pitfalls in the Roentgen Diagnosis of Pulmonary Disease
Philip J. Hodes, M.D., Philadelphia, Pennsylvania 699

The Effect of Cheyne-Stokes Respiration on Prognosis
Richard F. Herndon, Jr., M.D., and *Harry L. Smith, M.D.,* Rochester, Minnesota 704

Development of a Simplified Filter Paper Electrophoresis with a Study of Human Serum Proteins
Matthew A. Kiess, O.S.B., Ph.D., Collegeville, Minnesota, *Robert P. Koenig, M.D.,* and *Clifford R. Myre, M.D.,* Paynesville, Minnesota....707

Fluid and Electrolyte Balance:
Part III: Medical Considerations
Edmund B. Flink, M.D., Minneapolis, Minnesota..715
Part IV: Surgical Considerations
Bernard Zimmermann, M.D., Minneapolis, Minnesota 722

Seminar:
Brucellosis
James D. Townsend, M.D., Saint Paul, Minnesota 732

Laboratory Aids to Medical Practice:
Necropsy: Its Religious Implications
Duane N. Tweeddale, M.D., Rochester, Minnesota 739

Case Report:
Superior Mesenteric Vein Thrombosis
McLemore Bouchelle, M.D., and *Harold H. Joffe, M.D.,* Virginia, Minnesota 741

President's Letter:
Too Much Trouble? 743

Editorial:
Building for the Future 744
Medical Education on Tape: Part II 745
Too Many Meetings 746

Public Health:
Minnesota's Facilities for Care of the Chronically Ill and the Aged 747
School of Public Health in New Quarters 748

Medical Economics:
PR Institute Well Attended 750
Board Suggests Ordinance to Prevent Nursing Home Fires 750
Social Security Passage Called "Severe Setback"..751
Report Describes Health Behind the Iron Curtain..751

Minnesota State Board of Medical Examiners 753

History of Medicine in Minnesota:
The Pioneer Doctors of Chippewa County
Leon G. Smith, M.D., Montevideo, Minnesota....754

Minnesota Academy of Medicine:
Meeting of January 13, 1954 762
The Physician and His Taxes
William R. Busch, Saint Paul, Minnesota 762

In Memoriam 769

Reports and Announcements 770

Woman's Auxiliary 774

Communication 774

Of General Interest 775

Book Reviews 778

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THE DIGNITY OF MEDICINE

JUSTUS OHAGE, M.D.
Saint Paul, Minnesota

THE HONOR of being president of the Minnesota State Medical Association is one that I never anticipated and never felt worthy of, and still I look forward to next year when this Association will pay me a greater honor and that is the opportunity to sit among those noble gentlemen, the past presidents of this Association —the men who did so much, who gave so much of their wisdom, their time and energy to make this, the Minnesota State Medical Association, one of the greatest, one of the finest, and one of the friendliest medical associations in these United States. These men have built the road so well that it has been very easy for me to follow in their footsteps. I wish to thank them, and may God bless them.

For several years past, there has been a tendency among the presidents to make their addresses shorter and shorter. I also shall be brief, but it is not our intention to condemn the presidential address to complete oblivion.

Having celebrated our centennial last year, we physicians may now feel more at ease, I suppose, in the face of history. Somehow, when some great event in our lives has been duly celebrated, we are inclined to relax and feel a little self-satisfied. However, we have shown that we are here to stay. More than that—we can look forward without fear, knowing that we can surmount the difficulties to come, just as we did the seemingly unsurmountable hazards of the past. Our inherited tradition, we are confident, will see us through these hazards. Let us hope that we are worthy of this tradition.

Presidential Address delivered at the 101st Annual Meeting, Minnesota State Medical Association, Duluth, Minnesota, June 8, 1954.

The dignity of medicine is what sets it apart from other professions, what creates confidence of patients in physicians and permits them to entrust their lives to our hands.

The dwelling place of the dignity of medicine is in the conduct of the men and women who practice medicine and also in those who are associated with them in the healing arts and professions. This dignity has deep roots. It goes back centuries. It revealed in many phrases of the ancient Hippocratic oath. For example, "Whatever houses I may visit, I will come for the benefit of the sick." And again, "In purity and holiness, I will guard my life and my art."

Everyone who comes in contact with physicians learns to recognize the dignity of medicine in its practitioners. It is something more than integrity, gravity, responsibility, knowledge, acumen or skill—though it partakes of all of them. I suspect that the dignity of medicine is closely akin to what we mean by the essential dignity of man.

Actually, a rather curious and uncomfortable parallel can be traced between those days of 1854 and this year of our Lord, 1954. Minnesota was enjoying a boom then and real estate men were revelling in the glories of getting rich fast. Physicians were arriving in haste on boats from the East to the new and promising territory, and just around the corner were hard times and war.

And, just around the corner for us here tonight may be hard times and war. We cannot be sure. Looking at the present-day situation from a broad view, it is not easy to be optimistic. For in the background and under the surface of this happy occasion, the sensitive listener and viewer might hear and see again the relentless

march to a war more devastating than any of our fathers, or any of us for that matter, ever dreamed of.

But, we can hope sincerely that future generations will honor us justly for the steady courage and devotion which we use to lay a firm foundation for things they will take for granted—just as we revere and respect the foundation built for us by our own forebears.

Physicians can trespass upon the dignity of medicine when they maintain rigid attitudes toward the changes in medical practice and organization that must inevitably occur—and at a rapid tempo in our time. They trespass when—except in emergencies—they deny the team concept of medicine.

The art of medicine does not, however, depend solely on skill and knowledge. There is much still to be said for the presence of the physician as an element in the healing process. I recall to you statements made about a distinguished physician of an earlier generation, Sir William Osler.

His biographer said of him that he entered the sickroom "with an air of gaiety, an atmosphere that lifted the invalid out of his ills" and made half a ward forget its symptoms.

Likewise, I nurture a reasonable hope that they will have no cause to censure us for any failure to live up to the strong ideals handed to us from the past. The thought of such a failure becomes to us one of the greatest challenges we must ever face. The results of that failure would surely be more disastrous to the future of medicine and our society than most of war's great harm—so great is the value of this inherited foundation.

My own father was a physician and so were my grandfathers—a heritage of which anyone would be proud. But that is a background which is not uncommon in medicine. A strong thread of continuity of calling and duty runs unstinted through many generations of medical people. For that very reason, we physicians, as much as, if not more than, most men should feel a strong, personal, and intense sense of grave responsibility as we look in both directions—to the safe years of the past, and to the uncertain years of the future.

Recently, medicine has been the open target of criticism. Some of this criticism may be easily dismissed as uninformed and ill-natured. And yet, some of these criticisms, if considered with deep humility and carefulness, can show us clearly the direction in which we may have failed. Some of them are genuine grievances against some phase of medical practice, and it is only natural for the complainer to transfer his singular problem to a condemnation of the entire group.

As physicians, we can never afford to lose sight of the individuality and the personality of each and every patient we see. This is our tribute, paid daily, to the dignity of man. It is reflected back on us in the high regard that our patients and the public have for the ultimate dignity of medicine.

Somehow, I cannot believe that our inherited tradition has served us vainly. I have a deep and abiding faith in the high ideals so nobly advanced to us by our forebears. It is within our power to enliven, enrich and entrench that glowing tradition so firmly and deeply that the profession of a century hence will thank us for strength and courage, as we thank our forebears today.

We have reaped a fine harvest, we have been endowed with uncompromising responsibility, we have been given a near-sacred trust. We must not fail that trust—we must be faithful to it.

625 Lowry Medical Arts Bldg.

LAURELS FOR AMA FILM

Two honors recently were heaped on the popular documentary film, "A Citizen Participates," on which the AMA holds television rights. The film received top rating as an educational motion picture at the Cleveland Film Festival and was chosen by *Scholastic Teacher* for a national film award as a 16 mm information film. This film describes how members of a rural community can work together to get a physician.

AMA's exclusive TV rights to this film have been extended to December 31, 1954, so that only state and county medical societies may book the film for their local TV stations. After that date, however, it will still be available for 16 mm showings to church, school, club and similar gatherings. Bookings may be arranged through AMA's TV Film Library.

PITFALLS IN THE ROENTGEN DIAGNOSIS OF PULMONARY DISEASE

PHILIP J. HODES, M.D.
Philadelphia, Pennsylvania

I AM DEEPLY conscious of the responsibility of speaking to you on this occasion dedicated to the memory of Russell D. Carman. It is an honor I shall always cherish.

From what I have learned about Dr. Carman, I am sure there is no need for me to attempt to recall here his contributions to medicine. Those of you who knew him personally or were raised in his shadow in this part of the country can recount them far more effectively than I. Sympathetic understanding of the problems of others, a dedicated sense of justice, boundless energy, and above all, selflessness characterized the man for whom this honor lecture is named. In remembering Dr. Carman, one cannot help but remember the things he stood for. By so doing, we are afforded the opportunity to re-dedicate our lives to the ideals that were Dr. Russell D. Carman's.

Uncritical adherence to established principles can be dangerous, for it tends to stop progress. Equally true, in all walks of life "uncritical adherence" is particularly undesirable in medicine where the dogma of today often is frowned upon tomorrow. It is in this spirit that we have chosen to discuss some of the pitfalls that exist in the roentgen diagnosis of pulmonary disease.

As indicated by Rigler,[8] Newell,[6] Garland[4] and others,[1,7,9] the roentgen examination of the chest is beset with many difficulties and shortcomings. Yet, many continue to regard it as the last word in the recognition of pulmonary disease. Last word though it is, and highly informative as it is, all physicians must realize its limitations for it "is better to know you are wrong than hope you are right."

In the chest, as in all radiography, good films are of fundamental importance. It matters little how expert a radiologist may be, he cannot see what has not been imprinted upon his roentgenograms.

From the Department of Radiology, Hospital of the University of Pennsylvania, Philadelphia, Pa.

Russell D. Carman Memorial Lecture delivered at the annual meeting of the Minnesota State Medical Association, Duluth, June 7, 1954.

It is not within our province to discuss here the factors that play a part in good film quality. Suffice it to say, they encompass every possibility from the handling of the patient to the exposing and finally the processing of the film. Even the film viewing boxes cannot be overlooked.

In the chest, air is an important contrast medium. Infiltrates, effusions, or masses displacing normal air produce contrasts which are interpreted in terms of disease by the radiologist. Differences in air contrast occur normally in the chest with every breath. Indeed faulty aëration due to poor technique is a common source for error in this examination. Unless properly controlled abnormalities will be reported where none exist. Remarkable differences in the healthy chest can be produced deliberately by guided changes in pulmonary ventilation.

The ease with which lesions may be overlooked in films of poor technical quality is clearly demonstrated by the following example. Routine roentgenograms of the chest revealed a spherical mass 3 cm. in diameter in the paracardiac portion of the right lower lobe. Roentgenograms made with the patient slightly rotated failed to reveal the mass now hidden by the cardiac silhouette. Even more impressive is the obliteration of the soft tissue mass which followed poor film processing with over-developing.

As most roentgen findings are not pathognomonic, the radiologist constantly judges roentgen findings in the light of the patient's clinical picture. Consider diffuse pulmonary nodulation as an example.

Felson and Heublein[3] tabulated approximately eighty diseases capable of producing disseminated pulmonary changes. Among them, they included lesions due to aspiration, cystic pulmonary lesions, abnormalities due to noxious agents and hazardous dusts, diseases due to deposited foreign bodies, embolization, trauma, vascular abnormalities, bronchial abnormalities, abnomalities due to infections or infestations, allergy, pulmonary fibrosis, changes due to the hemopoietic system, sarcoid, malignancy and tuberculosis.

Faced with a differential diagnosis encompassing this host of diseases, the radiologist can be of little or no assistance as a consultant unless adequate clinical information is supplied him. Only then are the patient's best interests served, for the roentgen examination alone often proves meaningless. Witness the following examples; the first patient revealed generalized cardiac enlargement associated with multiple nodular lesions distributed throughout both lungs. Investigation revealed the patient had been a hard coal miner for thirty-five years; this patient had silicosis.

The next patient also revealed disseminated pulmonary nodulation radiographically. This individual, however, presented a history of rheumatic fever, which suggested that the roentgen changes were due to rheumatic pneumonitis. This seemed a reasonable conclusion, for these changes are known to occur in young adults in as high as 60 per cent of the patients with severé rheumatic fever.

Disseminated pulmonary mottling was found radiographically in still another individual. This patient, however, had gastrointestinal complaints. When a gastric cancer was identified radiograhically, logic dictated that the lung lesions were metastatic which was ultimately proven.

The next patient might have caused confusion had it not been known, clinically, that the patient revealed skin lesions, peripheral adenopathy, and conjunctivitis. With this history suggesting sarcoid, it seemed reasonable to conclude that the patient's pulmonary abnormalities were due to sarcoid also which proved to be the case.

This dependence upon adequate clinical information may also be demonstrated in patients with solitary masses.

The next patient had no clinical complaints. A mass 10 cm. in diameter was found, radiographically, in the paracardiac portion of the right lower lobe. Fluoroscopically, the mass change easily with changes in position. This change in configuration due to gravity is a common finding in patients with cysts or very soft tumors. For this reason, as well as others, the mass was considered a mesothelial cyst which it proved to be.

A mediastinal mass about 10 cm. in diameter caused substernal distress in another individual. Except for some encroachment upon the trachea and esophagus, nothing distinctive was noted fluoroscopically. One statement in the clinical history gave the clue to the diagnosis; the man had noted fullness in his breasts and some pigmentation of his nipples. This proved to be a choriocarcinoma of the mediastinum; this diagnosis, offered pre-operatively by the radiologist, proved to be correct and was possible only because adequate clinical information was available.

Another patient complained of weakness. Her roentgenograms revealed a small mediastinal mass arising in the carina which revealed no distinctive abnormalities. Clinically, this patient presented the classical findings of myasthenia gravis. With this clinical information, the diagnosis of a thymic tumor seemed logical; the diagnosis was confirmed at operation.

The tendency to ignore one part of the roentgenogram in favor of another is one of the most common pitfalls in radiology. Unless roentgenograms are studied systematically important information may be overlooked entirely. There is an old adage in radiology which says, "look at the four corners of the film." Witness the following which bear ample testimony to the truth of this adage.

The first patient had Hodgkin's disease. He had no complaints referrable to the shoulder. In the routine chest roentgenogram, however, a destructive lesion was found in the corocoid process of the scapula, which ultimately proved to be due to Hodgkin's disease.

The next patient had no complaints except weakness. Whereas, the chest was considered normal, a soft tissue mass was observed, radiographically, in the left supraclavicular fossa. This proved to be a group of lymph nodes which revealed lymphosarcoma. The possibility of supraclavicular lymph nodes was suggested in another chest examination; here the densities were artefacts caused by plaited hair.

The tendency to relax when things seem obvious, radiographically, is another common pitfall. The next patient was examined because of marked anemia. When a large esophagogastric hernia was found it was considered the cause for the anemia. Because the hernia, when full of barium, did not occupy the entire soft tissue mass demonstrated in the chest, the radiologist thought it would be advisable to examine this patient's colon.

The barium enema revealed an anular carcinoma in the transverse colon. Had the entire gastrointestinal tract not been examined, the carcinoma would have been overlooked and the hernia alone repaired.

Mistakes were also made in the next two patients because the roentgen findings seemed obvious. The first was examined soon after a severe automobile accident. The chest had been injured, and the patient was being examined for fractured ribs. Among other findings, the radiologist described a large abscess in the right lower lobe. The patient had been perfectly healthy until the time of the accident. The second patient presented a similar story. She, too, had been in an automobile accident and suffered serious chest trauma. In addition to the fractured ribs and a pneumothorax, the radiologist described an abscess in the right lower lobe and a second abscess in the left upper lobe. Here, too, there were no pulmonary complaints prior to the injury.

In both patients, the radiologist was wrong; both had pulmonary hemorrhages plus pneumatoceles which looked exactly like lung abscesses. Had the clinical histories been carefully evaluated when the patients were first examined, these mistakes would not have been made.

The next patient complained of early heart failure. The clinician thought there was a pleural effusion in the right hemithorax. Routine roentgenograms of the chest revealed no evidence of fluid in the right hemithorax; except for some elevation of the right hemidiaphragm the chest was considered normal. At the insistence of the clinician, the patient was fluoroscoped. Once again, nothing suggesting fluid was observed; the right hemidiaphragm was moderately elevated yet moved freely. On deep lateral bending, however, fluid appeared in the costophrenic sulcus. Routine lateral decubitus films then demonstrated a considerable quantity of fluid in the right hemithorax; 1000 cc. of straw-colored fluid were then removed.

The next patient also demonstrated an error which was the result of haste because something seemed obvious. This patient had no complaints except a slight superficial cough. A nodular density 3 cm. in diameter was observed in the left lower hemithorax; the patient was operated upon immediately for an early bronchogenic carcinoma. At operation, the density proved to be a healing fractured rib; the lungs were normal.

An error was made in the next patient too because things seemed obvious radiographically. The patient had had a breast removed. Routine roentgenograms of the chest revealed an interstitial air and fluid collection in the region of the mastectomy. The latter being brilliantly visualized attracted the radiologist's attention; a pneumothorax in the underlying lung which was 20 per cent collapsed was overlooked.

In differential diagnosis, the element of time plays an important part. Sometimes it is misleading as in the following twenty-four-year-old woman in whom a 5-centimeter spherical mass was found during a chest survey examination. Four years later the same lesion was identified; this time, for the first time, the patient was told what was found. The lesion not having changed in size during the four-year interval and because it was totally asymptomatic, it was difficult to advise the patient concerning its surgical removal. The patient chose to have the nodule removed; it proved to be a well-encapsulated liposarcoma.

The time factor also played a part in the next individual who, for years, had had chest roentgenograms semi-annually because he worked in a tuberculosis sanatorium. Five months following his interval examination, a round parenchymal infiltrate was found in the left lower lobe. Considered cancer because of the patient's age, its nodular character, and its sudden appearance, operation was performed immediately. The lesion proved to be a tuberculoma.

The next patient also worked in a tuberculosis sanatorium. He, too, was examined at regular intervals and, for years, revealed an apparent stable calcific density in the left upper lobe. After many years, the calcific density began to increase in size; it was thought that this patient was reactivating an old tuberculous process. In spite of adequate treatment, the lesion continued to grow larger. When operated upon, this proved to be a bronchogenic carcinoma engrafted upon an old calcified tuberculous lesion which still was healed.

No discussion of pitfalls in the diagnosis of pulmonary disease would be complete without mention being made of the hazards attending the roentgen diagnosis of pulmonary emphysema. Too often is this diagnosis made because the lungs seem hyperaerated. Suffice it to say that the diag-

nosis of pulmonary emphysema cannot be made on the basis of a single film alone. Of paramount importance in the diagnosis is fluoroscopy. Unless one can demonstrate fluoroscopically (or radiographically) limited motion of the domes of the diaphragm plus some fixation of the costal cage, the probabilities are that the patient does not have emphysema. Hyperaeration as a normal finding is by no means uncommon in glass blowers and wind instrument players.

Worth recording at this time are the possible advantages derived from the use of body section radiographic techniques; advantages which help reduce potential pitfalls in the diagnosis of pulmonary disease. With experience and with better appreciation of the many physical factors that play a part in body section radiography, it is becoming increasingly common to identify by means of this technique pulmonary lesions which might otherwise have been overlooked entirely. The evidence indicates that the body section examination more closely approximates the true size of the lesion than routine roentgen examinations. It is only fair to state, however, that many body section units may not be as effective as they might be for reasons which do not concern us here.

Attention should also be called to advantages that may be derived from the use of new image amplification tubes of the type developed by several x-ray manufacturers. These image-amplifying instruments reveal more brilliantly the detail in certain segments of the chest, the hila particularly, which has proven a distinct advantage. With it, minor abnormalities in the dynamics of the hilar structures have been revealed.

One of the inponderables in the interpretation of chest roentgenograms is the mental attitude of the radiologist. On some days, he tends to "overread," with minor roentgen changes assuming major importance. On other days, he is more optimistic and tends to "underread" what he sees. This change in mental attitude was studied carefully by Birkelo[2] and his group who submitted roentgenograms of the chest in a series of 1256 patients for interpretation to two radiologists and three chest specialists. They demonstrated a real variation in film interpretation between individuals (inter-individual) and between multiple readings of the same individual (intra-individual). From this study, it was concluded that all survey roentgenograms and mass survey work should be read independently by at least two interpretors and all persons whose roentgenograms were interpreted as positive or suggestive for tuberculosis by one or the other interpretors should be recalled for further study. The degree of inter-individual variation in interpretation, for positive cases only, by the five experts was from 5 to 25 per cent. The intra-individual or personal variations for multiple readings were from 3 to 31 per cent. Birkelo's observation has been substantiated by others;[4] thus we are now aware of the fact that survey procedures although good are susceptible to a human error of about 20 per cent.

Lest the medical profession become too critical of its radiological confreres, attention should be called to the fact that other surveys similarly controlled have revealed similar discrepancies. In a study of 221 children, five expert pediatricians were asked to classify them according to their nutritional state. When their study was completed, which included allied diagnostic procedures, there were only seven patients (3 per cent) in whom all five examiners agreed.

In 1944, we began a clinical survey of the chest using roentgen examinations made a little before and immediately after death which were then compared with roentgenograms of the same patient's lungs removed and inflated at autopsy which later were cut and studied grossly and histopathologically.[5]

Our findings in these comparative postmortem studies of the chest may be summarized as follows:

1. As Rigler[5] and Newell[6] predicted, we often failed to identfy the small lesions under 3 mm. in diameter. Particularly was this true of pleural and subpleural nodules along the lateral chest wall and over the domes of the diaphragm. Similar observations have been made at operation; that is, pleural lesions were seen and subpleural nodules were felt, which were not demonstrable on preoperative roentgenograms.

2. Occasionally, we overlooked much larger lesions due to an error on our part.

3. Our greatest concern was the lung lesions we saw in roentgenograms of the excised lungs which we never were able to demonstrate in our original roentgenograms. Stated differently, even though we knew the size and nature of a pulmonary mass from our postmortem roentgenograms and pathologic studies there were occasions when

the lesion was never demonstrated roentgenographically in our original roentgenograms made immediately before death, before the chest was opened.

The following explanations have been suggested for these discrepancies. Some shadows are completely subliminal, below the threshold of visibility. Many lesions occur in the relatively blind areas of the chest which include areas along the parietal pleura, close to ribs, and in the midline where the spine and mediastinum obscure them.

Dr. William Tuddenham,[10] working in our department, has demonstrated that the probability of one seeing a lesion in a chest radiographically appears to be significantly limited by the following factors:

1. The low relative brightness contrast of some images which usually are those superimposed upon bone and mediastinum.
2. The glare and psychological distraction of large bright images which usually are the calcified structures.
3. The random variation in film density associated with the use of fluorescent screens.

Since two of these factors are related to the bright images cast by calcified structures it seemed reasonable to try to reduce contrast by going to the higher kilovoltages where the absorption of x-rays in bone relative to that of soft tissues is greatly reduced. Accordingly, roentgenograms of the chest made at 1,000 kv. were then compared with roentgenograms of the same individual's chest using routine factors at 80 kv. Lucite spheres of varying sizes were attached to the patient's back over the spine and lung fields to test the ability of each technique to record small tissue lesions in these areas.

In the supervoltage film, (1,000 kv. and 2,000 kv.), sphere as small as 6 mm. in diameter were visible in both the lung fields and the mediastinum. The larynx, trachea and the main stem bronchi were delineated, and the lung markings were fairly well recorded with this higher kilovoltage technique. In the control study, too, spheres as small as 6 mm. in diameter were visible in the lung fields, but no objects less than 40 mm. in diameter were seen in the mediastinum and only a portion of the trachea was recorded.

Thus, it would seem, from these observations that the use of supervoltage radiation in chest radiography offers distinct advantages over conventional radiography because it permits us to record on the same film, and with almost equal sensitivity, the soft tissues of the lung fields and of the mediastinum. Unfortunately, however, supervoltage radiography has some disadvantages which do not seem to be insurmountable. The dose the patient receives is still too high. Also, the time required for each exposure is still too long. However, there is the hope that further research in this field will make it possible for us to push farther forward our diagnostic horizons insofar as the chest is concerned and, by so doing, reduce still further our potential pitfalls and opportunities for error.

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THE EFFECT OF CHEYNE-STOKES RESPIRATION ON PROGNOSIS

RICHARD F. HERNDON, JR., M.D., and HARRY L. SMITH, M.D.
Rochester, Minnesota

ACCURATE prognosis is usually the most difficult, treacherous, obscure component in the total evaluation of the condition of a patient. It requires accurate diagnosis and thorough knowledge of the natural history of the disease, of the value of treatment, and of the effect of new developments on the course of a patient's illness. In many instances, prognosis is at best an educated guess, but careful consideration of it is necessary, as it frequently colors the physician's approach to a patient and his illness.

Prognosis may be altered by the spectacular and easily recognizable occurrence of Cheyne-Stokes respiration. As ancient and well investigated a pathologic respiratory condition as this is, it suffers from the label of being a "terminal" event.[11,15] Such a label in itself merits thorough investigation.

The classic papers of Cheyne[2] and Stokes[13,14] are excellent descriptions of the phenomenon known today as Cheyne-Stokes respiration. Many studies have searched for the basic mechanism of such periodic respiration. Eyster, in 1906, stressed a circulatory mechanism. He increased intracranial pressure in dogs and found that when the arterial blood pressure rose and fell alternately above and below the intracranial pressure, Cheyne-Stokes breathing ensued. The studies of Douglas and Haldane, in 1909, emphasizing a chemical mechanism, are still accepted with only slight modification. They proposed that Cheyne-Stokes respiration developed in the following way. Initially, the respiratory center in the medulla is depressed. Weak, shallow respirations result producing hypoxia. Hypoxia stimulates respirations which increase in vigor, but subside as carbon dioxide is eliminated; apnea ensues. Apnea results in hypoxia and prevents carbon dioxide elimination; the center is stimulated and breathing returns; the cycle repeats itself. The excessive loss of carbon dioxide during hyperpnea removes its stabilizing influence upon the respiratory center. (This is compared to a fly-wheel on a motor.) Normally, large carbon dioxide stores in lungs and tissue fluids oppose any sudden fall in blood carbon dioxide tension. Tissue fluids buffer any sharp increase in carbon dioxide tension. Reduced bicarbonate reserve in Cheyne-Stokes respiration permits slight changes in gas tension to produce exaggerated fluctuations in the respiratory center.

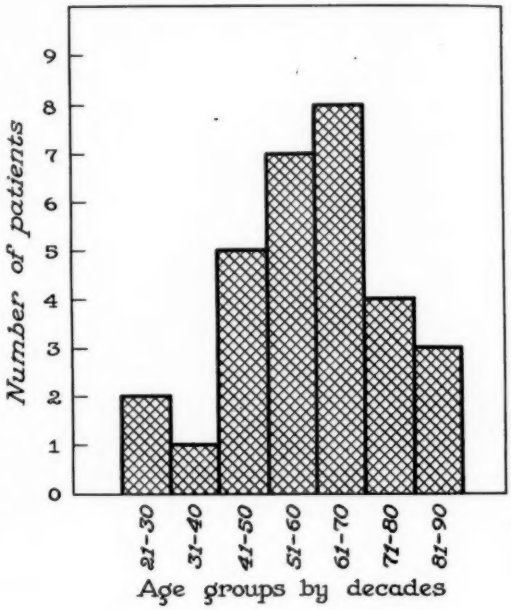

Fig. 1. Ages of thirty patients.

In the 1930's, further clinical[1,3,16] and experimental[7] investigations substantiated Douglas and Haldane. At this time also, the therapeutic use of aminophylline drew the attention of many writers.[6,8,9,12] A more recent paper by Pryor stressed both the chemical and circulatory factors. From his cases he concluded that with marked increase in circulation time, overventilation or apnea can continue for a long period before altered blood can arrive at a sensitive area to correct the situation. While the respiratory center is responding to this blood, the blood in the lungs is being altered in the opposite direction. Once started, periodic breathing is self-perpetuat-

Dr. Herndon is a Fellow in Medicine of the Mayo Foundation. Dr. Smith is an emeritus member of the section of medicine, Mayo Clinic.

TABLE I. FATAL PROGNOSIS PREVAILINGLY UPHELD

Case	Age, Yr.	Sex	Fate	Time Followed After Onset of "Cheyne-Stokes"	Basic Disease				Aminophylline Used?	Comment
					Cardiac	Vascular	Cerebral	Renal		
1	60	M	Died	1 day			+		No	Subarachnoid hemorrhage due to ruptured aneurysm.
2	88	M	Died	1 day	+		+		No	Cerebral embolism secondary to myocardial infarction.
3	65	M	Died	1 day			+		Yes, with benefit	Cerebrovascular accident, cancer floor of mouth.
4	55	M	Died	1 day		+	+		No	Hypertension, cerebrovascular accident.
5	69	F	Died	1 day	+		+		No	Multiple cerebral emboli secondary to myocardial infarction.
6	87	F	Died	2 days			+		No	Cerebral infarction, pulmonary emboli, hip fracture.
7	63	F	Died	1 day	+	+		+	No	Kimmelstiel-Wilson's disease with uremia, hypertensive and coronary disease.
8	24	M	Died	1 day	+			+	No	Chronic nephritis, uremia and pulmonary edema.
9	26	M	Died	3 days		+		+	No	Hypertension group IV with uremia.
10	81	M	Died	4 days	+			+	No	Chronic nephritis, uremia, myocardial infarction.
11	46	M	Died	4 days		+		+	Yes, with benefit	Hypertension group IV with uremia.
12	65	M	Died	5 days		+		+	Yes, with benefit	Hypertension group IV with uremia.
13	40	M	Died	6 days				+	No	Acute carbon tetrachloride poisoning with uremia.
14	55	F	Died	9 days		+		+	Yes, with benefit	Kimmelstiel-Wilson's disease, uremia and hypertension.
15	73	F	Died	14 days			+		No	Cerebrovascular accident.
16	70	M	Died	15 days			+		No	Metastatic cancer of cerebellum, primary in cecum.
17	68	M	Died	5 weeks	+	+			Yes, with benefit	Coronary and hypertensive heart disease with heart failure; probable intracranial arteriosclerosis.
18	77	F	Died	2 months	+		+		No	Multiple cerebral emboli secondary to mitral stenosis.
19	43	M	Dismissed; home	7 days				+	No	Chronic diffuse nephritis, impending uremia.
20	68	M	Dismissed; home	3 days	+	+			Yes, with benefit	Hypertension group IV with heart failure.

ing because of the delay in communicating events in the lungs to the respiratory center.

This study was undertaken to elaborate on and to evaluate further the gloomy prognosis "terminal" attached to Cheyne-Stokes respiration, and to discover, if possible, information pertaining to the total status of patients with that respiratory mechanism.

Material

The records of about 300 seriously ill patients of the Mayo Clinic, hospitalized in 1950, were reviewed. No attempt was made to conduct a complete canvass of all hospitalized patients; however, special emphasis was placed on patients with vascular, cardiac, cerebrovascular and renal disease. Thirty patients were found to have had Cheyne-Stokes respiration at some time in the course of their illness. It is this group which we studied.

Data

In the group of thirty patients with Cheyne-Stokes respiration, men outnumbered women in the proportion of 22 to 8 and ages varied from twenty-four to eighty-eight years, averaging 60.2 years. The distribution by age is shown in the figure.

A summary of the patients is provided in Tables I and II. Patients reported in Table I upheld the standard prognostic implication that Cheyne-Stokes respiration is a "terminal" or "late" development in the course of a disease. Those reported in Table II tend to refute that view, as their course seemed to be unaffected by the appearance of periodic respiration.

Discussion

A glance at the preceding tables makes certain points clear. These points are:

1. From cases 1 to 6, 15 to 17, 21 to 23 inclusive: When cerebral disease was complicated by the appearance of Cheyne-Stokes respiration, three patients survived the episode whereas nine did not.

2. From cases 7 to 14 inclusive, nineteen: When Cheyne-Stokes respiration developed in the presence of severe, progressive renal insufficiency, the situation was essentially terminal. One such patient survived the episode but eight did not.

3. From cases 21 to 25 inclusive: If the patients' illness consisted of reversible cerebral or renal embarrassment, the prognosis was not adversely affected by the presence of Cheyne-Stokes respiration.

4. From cases 26 to 30 inclusive: If Cheyne-

index of refraction of each of the separated colloid materials as they move past the measuring point, and the quantity of each constituent may be calculated from the curve obtained.

In Cushing's syndrome a typical protein pattern was found.[15] The plasma albumin and gamma-globulin were greatly decreased, while the alpha$_2$-globulin was elevated.

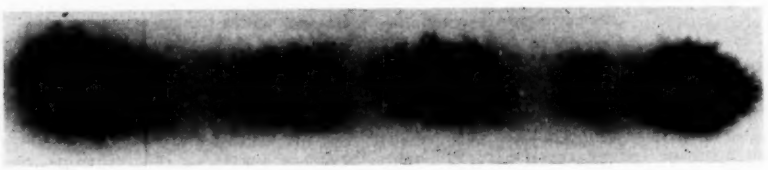

Fig. 1. This demonstrates the type of zoning produced by filter paper electrophoresis, the five major protein fractions are well deliniated. It can be seen that the darkest zone farthest from the original starting point (indicated by the pencil line) is albumin. Then alpha$_1$, alpha$_2$, beta and gamma globulin follow in that order. Azocarmine dye was used in staining, but this dye has not proved satisfactory for quantitative studies.

With this costly and delicate device, Tiselius was able to show for the first time that normal human serum protein consists of albumin, alpha$_1$, alpha$_2$, beta, and gamma globulins, and not simply albumin and globulin, as had been demonstrated by earlier chemical methods.[24]

For this important discovery, Tiselius was awarded the Nobel prize. Research workers the world over used this new tool in the study of colloids, particularly the proteins, and an enormous number of papers presenting important new information on the nature of proteins were published.[2] In medicine, human serum and other body fluids were extensively studied, and many interesting findings were reported. We shall mention only a few by way of example.

Longsworth, Shedlousky and MacInnes[18] found a very high beta-globulin value in the electrophoresis of plasma from nephrotics, as well as a lowered albumin and gamma-globulin. Alpha-globulin was found to be high. Examination of the protein of nephrotic urine demonstrated that the beta-globulin elevation so evident in the nephrotic plasma is not present in the urine. The nephrotic urine protein rather resembles that of normal human serum.[16]

In multiple myeloma, some of the most bizarre protein patterns have been obtained by electrophoretic study.[11,20] Four types of protein changes have been noted, all involving a large component of abnormal protein, which is located in a variable position in relation to the other protein fractions, apparently due to its variable mobility when subjected to an electric current.

In the early days of moving boundary electrophoresis, it was hoped that the method would be useful in many diseases as a specific diagnostic tool. With the exception of the above-mentioned diseases, as well as certain liver diseases,[8] this has not been the case. The stage to which any given disease has progressed at the time of the study and the severity of the disease process appears to affect the electrophoretic pattern significantly.[14]

In addition to its use in the specific diseases mentioned, the electrophoretic method is useful for studying the progressive changes in proteins during the course of many other diseases, and in following changes resulting from therapy. In addition, information concerning the changes in the various protein fractions is much greater than that obtained by standard chemical fractionation methods.[14]

A serious impediment to the more widespread use of this new technique in clinical medicine has been the great expense of the delicate Tiselius-type of equipment used in standard moving boundary techniques.

Recently, a simpler and less expensive method has been developed which promises to allow studies similar to those undertaken with the moving boundary method.[7]

This technique has been called zone electrophoresis because instead of moving through a free electrolyte solution, as in the moving boundary method, the colloidal matter migrates through a porous solid material which is saturated with an electrolyte to permit a current to pass through it.

When the migration has been completed and the various proteins separated, the solid material is dried and the isolated proteins are deposited in zones where they are accessible for further study, if desired. Starch columns, filter paper, or other similar porous, non-reactive material may be used as a supporting medium (Fig. 1).

Our interest in zone electrophoresis was recently aroused because we felt that if a simple technique could be worked out, zone electrophoresis might become a useful addition to the clinician's armamentarium in the study of those diseases producing alterations in human serum proteins.

The technique employed was basically developed by Kunkel and Tiselius, using filter paper as the supporting medium.[13] After reading this and other procedural literature on filter paper electrophoresis,[22] we found that a great deal of technical experimentation was necessary to finally work out a method which, in our hands, would enable us to produce quantitative results consistant with themselves and with moving boundary findings reported in the literature. Once the following method had been worked out, however, it became very simple to operate the equipment and produce dependable results.

The apparatus used is shown in Figure 2. This was assembled at a total cost of around fifty dollars. Pre-assembled zone electrophoresis instruments of a slightly different type, are now available from scientific houses at a higher price.

Power is obtained from a Heathkit variable voltage regulator which delivers the desired voltage to the apparatus by means of small platinum electrodes immersed in the buffer solution contained in the battery jars. The filter paper, previously moistened with electrolyte solution, is dipped into each jar of electrolyte solution and covered with glass plates to prevent evaporation. The current is thus conducted by the electrolyte solution from one platinum electrode through the filter paper to the second platinum electrode. The basic idea is that the protein mixture added to the filter paper is then exposed to a controlled voltage which causes the various protein fractions to migrate at different velocities (depending primarily on their surface charge).

When migration has proceeded so that all the fractions are separated sufficiently for analysis, the current is shut off, and the proteins are deposited in separate zones on filter paper where they are available for further study.

In order to achieve precise results considerable, attention must be paid to technical detail. For this reason, we shall present our method in detail.

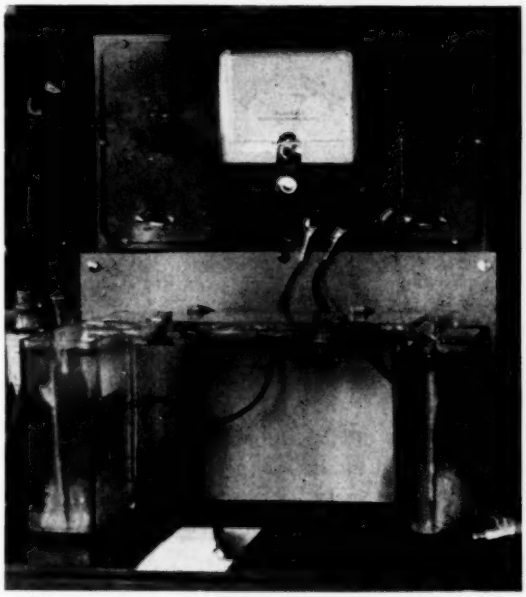

Fig. 2. The simplified filter paper electrophoresis apparatus.

The electrolyte buffer solution is prepared by dissolving 1.86 grams of diethyl barbituric acid and 150 grams of sodium diethyl barbiturate (both U.S.P. grades) in distilled water to make one liter of solution. This provides a constant pH of 8.8.

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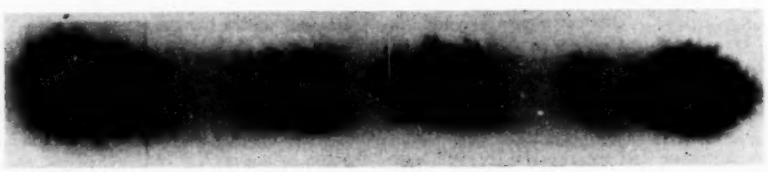

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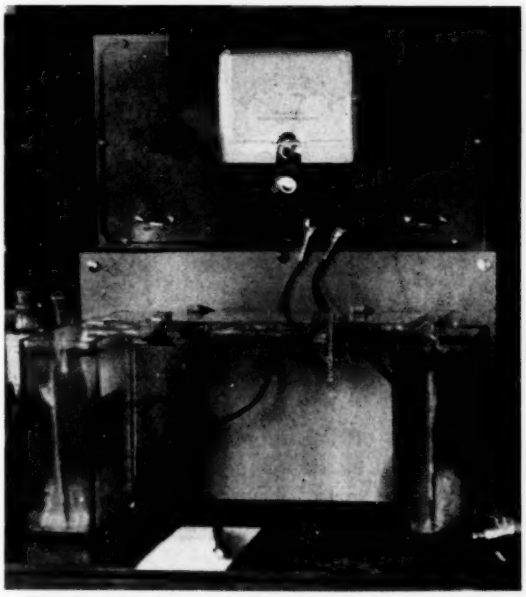

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man 2 has proved most satisfactory in our experience. The paper size found most convenient for our work is 9 x 36 cm., but size is not essential.

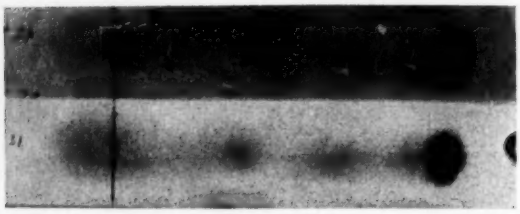

Fig. 3. The upper chromatogram was obtained using two-day-old serum. The lower was obtained using the same serum after fourteen days of refrigeration. No essential change is seen. The five major zones are not as well delineated as with the azocarmine dye used in Figure 1, but accurate quantitative results are obtainable from this chromatogram.

In setting up the equipment for use, a pencil line is drawn at the mid-point of the paper. It is then dipped into the barbital buffer. The excess buffer solution is removed by careful blotting. The paper is then placed on top of one of the plate-glass plates which must be thoroughly polished with silicone grease. This glass plate rests on the edges of the battery jars, and is a few centimeters wider than the paper and about 10 cm. shorter. About 5 cm. of each edge of the paper is immersed in the electrolyte solution in the chambers of the battery jars.

Exactly five lambdas (0.005 ml.) of serum is applied to the mid-point of the paper on the previously made pencil mark with an ultra-micro pipette. The second glass plate, the same size as the first, and similarly polished with silicone grease, is carefully placed over the paper. The long edges of the plates are sealed with additional silicone grease to prevent evaporation. Steel spring clips or clothes pins are clamped over the edges to maintain the seal at the edges.

In our earlier work, a drop of dilute brom phenol blue dye was added to the serum before subjecting it to electrophoresis. This stains the fastest moving albumin fraction and the migration may then be followed visually.

We have found that serum specimens may be kept for weeks without significant changes in the protein fractions, provided the red cells had been promptly removed and the same kept refrigerated (Fig. 3).

TABLE I. COMPOSITION OF BLOOD SERUM PROTEIN BY PAPER ELECTROPHORESIS

Effect of Variations in Staining, Fixing, and Washing.

	Stain	Fixing with ½% Acetic	Washing	A/G
1	Tiselius	4 rinses in 20 min.	None	0.85
2	Tiselius	4 rinses in 20 min.	None	0.64
3	Durrum	Soaked for 5 min.	None	0.70
4	Durrum	5 min. in ½% HAc	5 min. in cold H_2O	2.30
5	Durrum	5 min. in ½% HAc	5 min. in CH_3OH	1.86
6	Durrum	3 min. in ½% HAc	10 min. in H_2O	1.72
7	Durrum	3 min. in ½% HAc	10 min. in CH_3OH	1.88
8	Durrum	None	10 min. in H_2O	2.25
9	Durrum	None	10 min. in CH_3OH	2.21
10	Durrum	None	10 min. in H_2O	1.13
11	Durrum	None	10 min. in CH_3OH	1.72
12	Durrum	1 min. in ½% HAc	3-5 min. in CH_3OH	1.53

Chemical analysis of the serum used in the above tests by micro-Kjeldahl gave the following:

Non-protein Nitrogen =32 mg./100 ml.
Total Serum Protein =7.0%
Albumin =4.8%
Total Globulins =2.2%
A/G =2.18

Note: For reasons explained elsewhere in the paper, the chemical and electrophoretic A/G ratios are not the same, the latter being lower. The technique which produced the best results, and which was subsequently used, is number 12.

Three or four drops may be run simultaneously, since the spread of drops of this size is only about 10 to 12 mm.

After the serum samples are added and the plates sealed, a ten-minute wait is allowed to permit the buffer solution to be absorbed by and to saturate the filter paper.

The current is then applied. We have found that the voltage is not critical, and have been employing 350 volts. With this potential, the albumin fraction moves at a rate of about 2.5 cm. per hour. The albumin is migrated through a distance of 9 to 10 cm., requiring between three and one-half to four hours. This permits a clear-cut separation of the protein fractions, even of the alpha$_1$ globulin and albumin fractions, which tend to remain closely related because of a similar mobility.

With this voltage and paper size, the amperage ranges from 10 to 15 milliamperes at room temperature. Cooling is not essential, but if a higher temperature develops, as is the case with Whatman 3MM paper, an ice tray atop the glass plates provides adequate cooling.

At the end of the "run," the ends of the paper are cut off. The plates are carefully separated by resting them vertically on the table and prying them apart rapidly with a sharp knife blade to prevent smearing of the protein spots.

After the protein fractions are separated on

the paper, the very critical matter of drying, fixing, and staining is carried out.

We have tried the methods recommended by Kunkel and Tiselius,[13] Schneider and Wallenius,[22] and Durrum,[5] and have found that with these techniques the globulin portions are abnormally high when compared with standard methods (Table I).

After much trial and error, a procedure was settled upon which does produce acceptable results.

The disengaged paper is first mounted horizontally on a wooden frame with thumb tacks and placed in the electric oven at 100° C. for five minutes. The dried paper is them immersed in Durrum's stain[5] for five minutes. Then the stained paper is fixed by immersion in a 0.5 per cent acetic acid solution for one minute. Next the wet paper is washed with pure methanol until the stain is removed completely from the protein-free portion of the paper, which usually requires from three to five minutes. The paper is then allowed to dry at room temperature.

With this method of staining, fixing, and washing, quantitative results consistent with themselves and with standard quantitative chemical methods are obtained. Table II shows a comparison between our zone electrophoretic analyses and standard micro-kjeldahl chemical analyses carried out on fourteen different human serum specimens. The ratio obtained by dividing the zone electrophoretic A/G by the chemical A/G compares very favorably with the accepted ratio obtained using the standard moving boundary method, namely, 0.68 and 0.72, respectively. The chemical A/G is higher than the electrophoretic A/G because in the chemical separation of albumin from the globulins, some of the globulins remain be-

TABLE II. SOME ALBUMIN-GLOBULIN RATIOS OBTAINED BY THE DYE ELUTION METHOD COMPARED WITH VALUES FOUND BY STANDARD CHEMICAL ANALYSIS

Sample Number	Dye Elution Method Relative Composition in Percent			Chemical Method Percent Protein		
	Albumin	Globulins	A/G	Albumin	Globulins	A/G
1	51.7	48.3	1.07	4.2	3.0	1.40
2	58.5	41.5	1.41	4.4	2.2	2.00
3	56.3	43.7	1.29	4.8	2.2	2.18
4	30.3	69.7	0.42	2.0	3.2	0.62
5	27.6	72.4	0.38	2.9	4.1	0.71
6	44.0	56.0	0.79	2.6	2.9	0.89
7	59.1	40.9	1.45	3.8	2.3	1.67
8	37.7	62.3	0.61	3.6	3.0	1.20
9	45.7	54.3	0.84	3.3	2.1	1.57
10	53.9	46.1	1.18	4.5	2.9	1.58
11	50.0	50.0	1.00	3.9	2.7	1.44
12	36.0	64.0	0.56	2.6	3.4	0.76
13	44.3	55.7	0.80	6.4	5.6	1.14
14	44.2	55.8	0.79	3.9	3.4	1.26
Average			0.90			1.32

$$\frac{\text{(A/G) Electrophoretic}}{\text{(A/G) Chemical}} = \frac{0.90}{1.32} = 0.68$$

$$\frac{\text{(A/G) for Free Moving Boundary Electrophoresis}}{\text{(A/G) for Chemical Precipitation Method}} = \frac{1.45}{2.00} = 0.72$$

TABLE III. COMPARATIVE ABSORPTION OF BROMPHENOL BLUE BY PURIFIED HUMAN ALBUMIN AND PURE HUMAN GAMMA GLOBULIN

Drops	Optical Densities	
	Albumin	Gamma Globulin
No. 1	0.422	0.390
No. 2	0.485	0.406
No. 3	0.458	0.398
No. 4	0.442	0.426
No. 5	0.523	0.458
No. 6	0.295	0.481
No. 7	0.478	0.416
No. 8	0.542	0.455
Average	0.443	0.429

Protein concentration of albumin = 2.81%.
Protein concentration of Gamma globulin = 2.73%.
Correction Factor for Difference in Concentration = $\frac{0.0273}{0.0281}$

$$\text{Brom Phenol Index} = \frac{0.443}{0.429} \times \frac{0.0273}{0.0281} = 1.03$$

NOTE: This table shows the similarity in the absorption of dye by human serum albumin and human gamma globulin. The albumin absorption of the dye is 3% greater than dye absorption by gamma globulin, which may be considered negligible for ordinary work. The eight drops used for each protein fraction varied in size, but in each series of drops the total quantity was 40 lambdas. The percentage concentration of protein was determined by the standard micro-kjeldahl technique. A number of other determinations were made, all of which were similar to the findings shown here.

hind with the albumin, whereas this does not occur during electrophoresis.

The dye elution method mentioned in Table II is an accepted quantitative technique used to measure the amount of dye absorbed by the various protein fractions spectrophotometrically, and thus, indirectly, the amount of protein.[10,13]

The stained zones on the paper are cut off with scissors into 1 cm. sections, the dye eluted with 2 ml. of saturated sodium carbonate solution in 50 per cent methanol, and the dye intensity measured spectrophotometrically at 595 millimicrons.

One problem that arises when employing this method is that with some methods differential dye absorption by the protein fractions occurs. Thus, investigators have reported quite a wide variety of "factors" used to compensate for the lower dye binding power of the globulins.[6,10,22] Using our method of fixing and staining, however, we have found that no such factor is required for the globulins.

In addition to obtaining results comparable to accepted moving boundary figures, as shown in Table II, we employed our fixing and staining technique using pure human serum albumin and purified human gamma globulin, after subjecting this material to electrophoresis in the usual manner. These stained zones, or spots, were analyzed as described above. This gave us a factor of only 1.03 for the globulins, which is a difference of only 3 per cent and may be disregarded for practical purposes (Table III).

Table IV is a summary of the zone or filter paper electrophoretic determinations which we have performed on a variety of clinical material.

Serum taken from the placental cord was compared with maternal serum. The individual results are shown in the upper part of the table, and the averages are at the bottom. This work

TABLE IV. RELATIVE COMPOSITION OF BLOOD SERUM PROTEIN IN NORMAL AND SOME PATHOLOGICAL CONDITIONS OBTAINED BY PAPER ELECTROPHORESIS

Number	Relative Composition in Per Cent Globulins						Diagnosis
	Albumin	Alpha$_1$	Alpha$_2$	Beta	Gamma	A/G	
K-36A	39.4	6.8	9.0	21.8	22.8	0.65	Maternal Blood
K-36B	56.6	6.1	7.1	11.1	18.9	1.30	Cord Blood
K-33A	44.3	7.8	14.9	16.0	17.2	0.79	Maternal Blood
K-33B	59.1	5.6	8.0	9.9	17.3	1.45	Cord Blood
K-39A	50.5	5.2	11.4	15.5	17.1	1.02	Maternal Blood
K-39B	60.0	6.2	7.7	11.2	14.8	1.54	Cord Blood
K-41A	40.7	5.9	9.4	19.2	24.7	0.68	Maternal Blood
K-41B	57.8	3.4	4.0	7.8	26.9	1.34	Cord Blood
K-43A	49.5	7.6	10.8	16.5	15.4	0.95	Maternal Blood
K-43B	59.0	6.0	8.8	9.1	16.9	1.43	Cord Blood
K-44A	51.2	6.7	10.7	13.2	18.0	1.02	Maternal Blood
K-44B	63.4	3.9	6.0	6.7	19.9	1.61	Cord Blood
K-45A	45.8	5.7	9.1	21.9	17.2	0.86	Maternal Blood
K-45B	54.7	7.1	7.5	13.1	17.4	1.21	Cord Blood
K-46A	58.4	5.0	9.2	18.3	9.1	1.40	Maternal Blood
K-46B	61.2	5.3	6.6	10.6	16.2	1.58	Cord Blood
Cohn*	59.1	6.0	9.1	14.0	11.8	1.44	Normal
K-32	58.5	5.0	6.0	11.0	19.3	1.41	Normal
MAK	56.3	4.4	6.0	17.3	15.9	1.29	Normal
WK	58.6	5.4	8.6	12.5	14.8	1.42	Normal
K-34	53.9	5.9	7.9	12.3	19.9	1.18	Pregnancy—3 mo.
K-35	50.0	7.3	10.9	17.2	14.3	1.00	Pregnancy—at term
K-28	44.2	6.6	8.8	21.5	18.2	0.79	Pregnancy—8 mo.
H-10	54.9	5.7	7.9	16.5	15.3	1.19	Pregnancy—4 mo.
K-42	46.9	5.2	8.4	18.4	20.9	0.88	Pregnancy—8 mo.
H-16	51.1	6.4	9.9	18.3	14.0	1.05	Pregnancy—8 mo.
H-18	56.3	4.8	10.3	15.6	12.8	1.29	Pregnancy—7 mo.
H-23	49.0	6.0	9.5	19.2	16.1	1.03	Pregnancy—3 mo.
H-24	34.1	5.8	13.5	14.6	31.9	0.52	Pregnancy—? mo.
H-25	49.2	5.6	13.3	14.4	17.3	0.97	Pregnancy—8 mo.
H-26	43.7	5.8	9.3	22.3	18.8	0.77	Toxemia in Preg.
H-6	36.0	5.5	10.7	10.2	37.4	0.56	Rheum. Arthritis
K-26	44.3	5.1	12.4	11.0	27.0	0.80	Acute Rheum. Fever
H-20	27.9	4.0	5.0	7.9	55.1	0.39	Multiple Myeloma
U-1-45	23.4	7.5	12.7	21.3	34.0	0.21	Hepatitis
H-6	36.0	5.5	10.7	10.2	37.4	0.56	Arthritis
H-9	36.6	10.2	10.4	13.4	29.2	0.58	Cancer of Liver
H-5	27.6	4.7	13.0	20.6	34.0	0.38	Cirrhosis
Average	47.5	6.3	10.6	17.8	17.7	0.92	Maternal Blood
Average	59.0	5.4	7.0	10.0	18.5	1.43	Cord Blood
Average	48.5	5.9	9.9	17.3	18.1	0.97	Pregnancies

*Adapted from the data of Cohn, Oncley, et al.; J. Clin. Invest., 23, 417 (1944).

agrees with similar studies using moving boundary methods,[17] and demonstrates that maternal serum contains significantly higher amounts of alpha$_2$ and beta globulin fractions, but appreciably less gamma globulin than the fetal serum.

A number of pregnancy cases were also studied and, as expected, were essentially the same as maternal serum drawn immediately after delivery. These cases show, on the average, an elevated beta globulin when compared with the normal values.

A group of normal values are also shown in Table IV. The values adopted from Cohn are the accepted normal values for moving boundary electrophoresis. The remaining data in the normal grouping consist of values obtained using blood drawn from individuals judged as clinically normal, or in good health.

Interestingly enough, K-32, one of the authors, shows an elevated gamma globulin and a slightly decreased alpha$_1$-globulin alpha$_2$-globulin, and beta-globulin. This individual had a mild upper respiratory infection about ten days prior to the acquisition of the serum specimen. It is well known that the gamma globulin fraction is elevated even in minor infections and commonly remains elevated for some time after clinical evidence of disease has disappeared.[7]

This case also illustrates the fact that the standard chemical determination of the serum proteins in this case would not show this variation because the total globulin value would be normal, as would the albumin and the A/G ratio.

The last section of the table shows a random sampling of some clinical cases in which the diagnosis was made by other clinical and laboratory methods. These cases show variations from normal as have already been reported by moving boundary methods,[3,4,19] and also illustrate, we believe, the possible value of the simplified and inexpensive filter paper electrophoretic method of serum protein analysis in clinical medicine's armamentarium.

Curves showing the distribution of the serum protein fractions can easily be drawn from data acquired by the filter paper electrophoresis method. These curves show graphically and conveniently the relative protein composition of any given serum specimen, and results are commonly expressed in this manner when the moving boundary method is employed. Fig. 4 shows a number of curves prepared from our data to illustrate this.

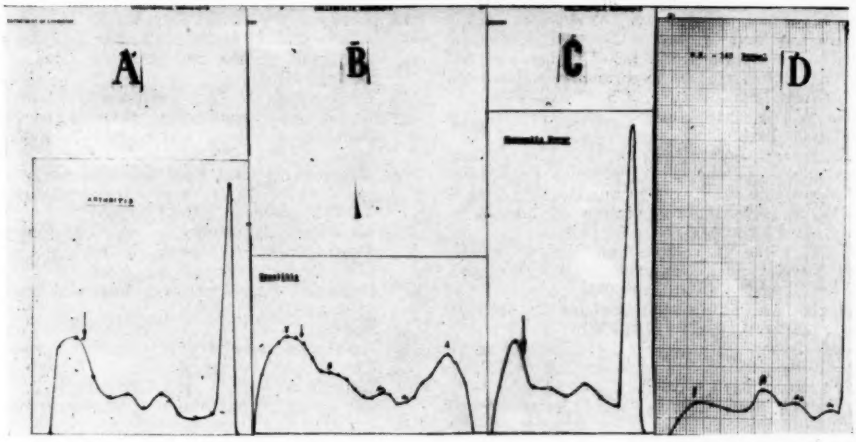

Fig. 4. Graphs plotted from filter paper electrophoresis data and analyzed quantitatively by the dye elution method. The areas under the curve are quantitative. A shows the pattern obtained from a case of rheumatoid arthritis. B represents the protein distribution in a case of hepatitis, being a marked deviation from the normal. C demonstrates serum from a patient with acute rheumatic fever. D is a normal pattern for comparison.

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PLACEBO THERAPY

The most pointed occasion when the physician must decide whether or not to lie is in the case of the patient with incurable cancer. As individuals, physicians are reluctant to lie, but as physicians we must maintain an elasticity of attitude. Plato, who dwelt at some length on the deportment of physicians, wrote, "A lie is useful only as a medicine to men. The use of such medicines should be confined to physicians." Parkinson embodied a strong defense of the physician's integrity in his succinct observation, "The facts are that in clinical science there is devotion to truth and conformity to scientific standards as scrupulous as anywhere, but in practicing the art truth has often to be softened." Incidentally, as Henderson suggested, what the doctor believes to be true sometimes isn't; the patient may thereby be misinformed, albeit unwittingly on the part of the doctor. Also according to Henderson, what the doctor actually says is not in itself important, but rather what the patient comprehends and what it does to him. A physician can usually evade a possibly harmful truth and still satisfy his patient. Such an evasion is on practical grounds preferable to an unequivocal lie, because a lie can be uncovered, and if this should happen, the physician will lose the patient's confidence and respect. If the patient is insistent, there is, of course, no alternative to the truth. Hippocrates, whose precepts are widely considered to be as good today as they were nearly 2,500 years ago, wrote as follows: "Naught should be betrayed to the patient of what may happen or of what may eventually threaten him, because many patients have been driven in this way to extreme measures." In general, honesty is the best policy, subject to modification according to circumstances. This question in the case of incurable cancer is still moot, and being tangential to the present discussion will not be considered further.

Returning to the consideration of deception as applied in medical practice, I will state that I believe deception is completely moral when it is used for the welfare of the patient. If this is admitted, who then is to decide what constitutes the patient's welfare? Omniscience would be an attribute desirable in any individual responsible for the welfare of another. Being human, however, the physician lacks this quality, but by the very nature of his position, is the best arbiter of this question when it concerns a patient. Therefore, when the patient's welfare dictates the use of a placebo there can be no detrimental reflection on the physician who prescribes it. In fact, the physician who in an appropriate situation refuses to order a placebo, implying in effect that "I can't help you because there is no medicine for your disease," is cruel and is surely not to be praised for his morality.—ALAN LESLIE: Ethics and Practice of Placebo Therapy, Am. J. Med., 16:854-862, June, 1954.

FLUID AND ELECTROLYTE BALANCE

Part III: Medical Considerations

EDMUND B. FLINK, M.D.

Minneapolis, Minnesota

INTRAVENOUS fluid therapy is of great value and often is lifesaving, but should be used only when oral feeding isn't possible. When it is used indiscriminately, it can also be detrimental and even result in unwarranted fatality. It is important, therefore, to review specific indications and contraindications.

There are certain general rules which were alluded to in the introductory article[4] and which will be discussed in more detail now. A chart such as the one reproduced in Table I is desirable. The arithmetic of intake and output of fluids, a record of weight daily or more often (a weight on admission to the hospital is as important as recording the body temperature), the separate recording of volume of fluid loss from fistula or drainage, blood and urine chemical determinations and other special items depending on the individual are simplified and clarified by using a chart. This chart can be modified to suit the emergency. In diabetic acidosis, for instance, columns for urine tests for sugar, acetone, diacetic acid and insulin can replace the columns for Na Cl and K output.

The record need not be kept in full detail for simple problems, but for patients with diabetic acidosis, metabolic alkalosis, anuria, low salt syndrome in heart disease, or acute dehydration of dysentery, a chart is definitely indicated. A fair approximation of the electrolyte loss from various sources can be made from the information collected by Randall[9] and recorded in Table II.

From this table it is evident that whereas sodium and chloride are lost in considerable amounts in gastrointestinal fluids, potassium losses are not great by this route. Therefore, it should be emphasized that the major avenue of loss of potassium is the kidney. The loss in a sick patient is greater than it is in a normal healthy subject. There is no way of estimating potassium loss in urine short of determining it, but this is rarely necessary in clinical practice.

From the Medical Service, Veterans Administration Hospital, Minneapolis, Minnesota, and the Department of Medicine, University of Minnesota.

A person in normal health at rest has a fluid balance about like this:

Output		*Intake*	
Urine	1500	Liquids	1500
Insensible water loss from skin and lungs	750	Water of food	500
		Water of oxidation	350
Stool	100		
	2350		2350

Note that water from food roughly balances the water lost by stool and insensible loss from skin and lungs; thus the actual water intake is roughly equal to the urine output. When the subject has a fever or is ill in any way, this will vary because the insensible loss will increase and food intake often decreases. Visible sweating obviously increases the fluid and salt loss. Pure water depletion occurs when the patient is unable to get water (lost on a desert or at sea) or is unable to swallow for various reasons such as coma or carcinoma of the esophagus. Thirst is a protective symptom to regulate water intake and prevent simple water depletion. Holmes and Montgomery[5] have studied thirst mechanisms in many illnesses including diabetes insipidus, shock and congestive heart failure. The rate of salivary secretion is a good measure of true thirst versus excessive water drinking. Unfortunately, thirst is not present and therefore not a useful guide to need for water in patients who have the most severe forms of dehydration, namely, those associated with electrolyte depletion. Fluids should be administered by slow drip intravenously unless otherwise specified. Subcutaneous administration should be abandoned entirely.[13]

The following discussions of specific disturbances may seem to be too rigid for some and not specific enough for others, but they are only intended as a general guide to the order of magnitude of therapy needed. It must also be clearly understood that the separate discussions relate to average situations and not to all possible variables. The discussion is not an indorsement of any particular commercially available ionic solutions. Some ready-made polyionic solutions are

TABLE I. A SAMPLE CHART FOR RECORDING FLUID AND ELECTROLYTE DATA

Time or Date	Wt.	Output						Intake								Chemistries					
		Urine	Other Loss	Total	Na	K	Cl	Oral	Other	Total	Na+	K+	Cl−	$\overline{HCO_3}$ or Lactate	Plasma or Blood	B.U.N.	Na+	K+	CO_2	Cl−	Hbg.

TABLE II. MEAN CONCENTRATIONS OF IONS IN MEQ./1. WITH RANGE OF VALUES IN TWO-THIRDS OF CASES IN PARENTHESIS[9]

	Na+	K+	Cl−
Gastric juice	59 (31- 90)	9.3 (4.3-12)	89 (52-124)
Bile	145 (134-156)	5.2 (3.9-6.3)	100 (83-110)
Pancreatic juice	141 (131-153)	4.6 (2.6-7.4)	77 (54-95)
Small bowel (suction tube)	104 (72-128)	5.1 (3.5-6.8)	99 (69-127)
Ileum (suction tube)	116 (91-140)	5.0 (3.0-7.5)	105 (82-125)
Ileostomy (recent)	130 (112-142)	16.2 (4.5-14)	110 (93-122)
Cecostomy	80 (48-116)	20.6 (11-28)	48 (35- 70)

alluded to and can be used to advantage under certain circumstances. Because of the recent availability of ion concentrates in ampule form, tailor-made solutions permit greater flexibility than any standard solution for the handling of complex problems.

A few general rules about the safe administration of potassium will be given now since they should be incorporated into the plan of therapy whenever potassium salts are given. An adequate urine flow must be established. In adults potassium solutions should not be given at a rate faster than 20 mEq. per hour. Too rapid administration can cause arrhythmias and even cardiac standstill. The solution should not have more potassium than 80 mEq. per liter and preferably not more than 40 mEq. per liter. Plans should be made so that the total potassium dose for 24 hours be distributed throughout all the fluids to be given for that 24-hour period unless specific indications dictate different policy (v.i. diabetic acidosis).

Diabetic Acidosis

The gravest of all medical emergencies involving fluid therapy is diabetic acidosis. It is important, of course, to be certain that the diagnosis of diabetic acidosis is correct and that the comatose or stuperous state of the diabetic patient is not due to insulin reaction, stroke, or other severe illness. Urinalysis, blood sugar, blood urea nitrogen, and carbon dioxide content (or combining power) of plasma must be determined immediately. The presence of mild acidosis with normal carbon dioxide concentration but with the appearance of ketone bodies in the urine requires the use of more insulin but not any parenteral fluid therapy. Evaluation of the severity of associated conditions and arrival at a calculated severity index is of considerable value.[15] Insulin therapy, of course, is the most important single element in recovery from diabetic acidosis, but insulin dosage will not be discussed in detail because it is beyond the scope of this paper. However, mention should be made of the order of magnitude of the dose. Give a total dose of 300-1000 units in the first day. When blood sugar is below 800 mg. per 100 ml. and acidosis is moderately severe, give 50-100 units initially (half of

dose intravenously in severe cases). Repeat this dose every half hour for four doses. In very severe cases and those with blood sugar over 800 give 100-200 units every half hour for six doses. Subsequent doses have to be determined by serial blood sugar determinations and urinalyses.

Butler and co-workers[2] actually determined the losses of electrolytes during a period of insulin withdrawal. The actual and derived data indicate that the water losses approximate 11 per cent of body weight, and suggest a loss per kilogram of 5 mEq. of sodium, 4 mEq. of chloride, 6 mEq. of potassium of which 3 mEq. corresponds to the loss of nitrogen, 70 mg. of phosphorus of which 60 coincides with the loss of nitrogen. This information forms a cornerstone for therapy.

The most urgent need initially is for water and salt. Many patients do not need any alkali therapy, for the kidney will sort out the needed ions from sodium chloride solution. It is sometimes highly desirable to give alkali when acidosis is particularly severe. Occasionally in terminal stages the pH is so low and the respiratory center so exhausted that Kussmaul breathing is not evident. In such extreme instances quick increase of blood pH may be lifesaving. It appears to the author to be more reasonable to give sodium bicarbonate than to give sodium lactate early, for the latter has to be metabolized in order for the sodium to become available. (Later on in therapy sodium lactate is an equally satisfactory source of sodium.) Potassium should not be given immediately because the serum concentration is usually high or high normal at the time of admission in spite of total body deficiency. If an adequate urine flow has been established, potassium therapy should be started four to six hours after initial saline and insulin infusion is begun. If 0.9 per cent sodium chloride solution is used exclusively to correct dehydration, the concentration of chloride ion rises above normal so there is a temporary state of "chloride" acidosis.[11] This empirical observation added to the knowledge of the nature of electrolyte deficit makes it highly desirable to give sodium in excess of chloride.

Glucose should be given as soon as the blood glucose approaches normal. There is no need to give any glucose earlier than this. Initial glucose administration is harmful by perpetuating glucosuria and hyperglycemia. The need for glucose is clear, when the blood sugar approaches normal, for additional insulin usually is needed to correct the remaining acidosis.

The following scheme of fluid therapy has been found to be quite satisfactory in the order given:

1. 1000 ml. distilled water with 50 mEq. of sodium chloride and two ampules of sodium bicarbonate or 89 mEq.
2. 1000 ml. distilled water with 100 mEq. of sodium chloride and one ampule of sodium bicarbonate or 44 mEq.
3. 1000 ml. of Travert No. 2® with one ampule of potassium chloride (20 mEq./ampule) or Ionosol K with invert sugar® or 1000 ml. of 5% dextrose in water with 50 mEq. of sodium chloride and 40 mEq. of potassium phosphate.
4. Repeat No. 3.
5. 1000 ml. of 5% glucose in water with 40 mEq. of potassium chloride.

By this time, oral fluids are usually tolerated. If not, more fluids of the type in 5 are given. The first two liters should be given rapidly over the course of three hours. Subsequent fluids should be given more slowly according to general precautions taken with potassium solutions. This amount of fluid gives more sodium and chloride and less potassium than the average deficit indicated, but it does approach the requirement and replenishes the volume of extracellular electrolytes and fluids lost reasonably well. Tailor-made solutions using ion concentrates offer further refinement of therapy. Deficit of potassium and phosphate will be corrected more gradually but is partially corrected in the first day. Magnesium deficit usually can be corrected simply by diet.

Special conditions alter this program. When there is an associated congestive heart failure, coronary thrombosis, or serious renal insufficiency, the rate of infusion and type of therapy have to be modified. Anuria in diabetic acidosis poses a special problem. In the first place it is advisable to replace all the fluid which has been lost according to standard calculation. However, potassium should not be given unless serious signs develop (by electrocardiogram or respiratory paralysis) and then only in a dose of 40 mEq. until urine flow is established. Once hydration has been accomplished the same rules apply as for anuria in general (v.i.).

As soon as acidosis is corrected the patient should be given food, first as liquids and then graduated to a full diet as tolerated.

Metabolic Alkalosis

The consequences of pyloric obstruction are serious and may cause death unless the obstruc-

tion is relieved after correction of the associated metabolic alkalosis. As opposed to a relatively sudden onset of diabetic acidosis this comes on so insidiously that it is often not suspected. There are few clear-cut signs pointing to alkalosis. The most important information is the story of profuse and persistent vomiting. Patients with obstructed duodenal ulcer, though, are often so used to vomiting that they will not mention vomiting without specific questioning. The only safe procedure is to obtain a carbon dioxide content (or combining power) and chloride concentration of serum on every patient with a history of recent vomiting. If alkalosis is found, serum sodium and potassium concentrations and a blood urea nitrogen are indicated procedures. Alkalosis of long standing can cause serious renal damage.[1] The pathogenesis of alkalosis is dependent on the loss of hydrochloric acid (i. e. Cl^- loss in excess of Na^+) and on potassium depletion, both of which augment each other. Potassium depletion without loss of gastric fluid results in metabolic alkalosis[3] of all degrees of severity and can be corrected only by administering potassium salts. Sodium chloride solutions will not correct severe instances of chronic alkalosis because sodium further displaces intracellular potassium and perpetuates or actually increases the severity of the alkalosis. Ammonium chloride alone will not correct alkalosis due to potassium deficiency.

The following general rules will help correct metabolic alkalosis.

1. Each day replace the volume of emesis or gastric drainage material with a solution containing sodium chloride and ammonium chloride in slightly hypotonic concentration. Such a solution can be made by adding 50 mEq. of sodium chloride and 50 mEq. of ammonium chloride to 1000 ml. of glucose in water or by mixing 2 parts of Travert No. 39® or ionosol G.® with 1 part of glucose in water.
2. Give KCl at a rate of 3 mEq./kg. of body weight/day until the potassium depletion is corrected and then at a rate of 60mEq./day to prevent recurrence of depletion.
3. Give an isotonic solution containing sodium and ammonium chlorides at a rate of about 2 liters per day until alkalosis is corrected. (Travert No. 33® or ionosol G® or 50 mEq. sodium chloride and 50 mEq. of ammonium chloride, and 40 mEq. of potassium chloride, per 1000 ml. of glucose in water.)
4. Obtain blood for chemical determinations every other day and occasionally every day.
5. Metabolic alkalosis due to simple potassium depletion (Cushing's syndrome, or therapy with ACTH or cortisone) can be corrected by oral administration of potassium chloride, potassium citrate or acetate alone.

The repair of intracellular potassium deficit is a slow process and requires from three to six days to complete. Darrow[3] states that 3 mEq./kg/day is the maximum rate at which potassium can be utilized.

Chronic Respiratory Acidosis

This has been discussed in the preliminary report[1] and is mentioned again only to emphasize the superficial similarity of chemical findings to those of alkalosis. Except under unusual circumstances parenteral fluid therapy is not indicated. The clinical condition of the patient is the most important diagnostic clue. A seriously-ill patient with inadequate food intake can develop potassium depletion and alkalosis in addition to respiratory acidosis. Potassium replacement therapy is indicated, but it is usually possible to correct the deficit by oral administration of potassium chloride. If pyloric obstruction develops in a patient with emphysema and acidosis, a combined defect develops—respiratory acidosis complicated by metabolic alkalosis. In general the rules of treatment of alkalosis applies to this situation, but the carbon dioxide and chloride concentrations will not return entirely to normal because of the respiratory acidosis.

Acute Dehydration Resulting from Severe Diarrhea

A violent attack of diarrhea can rapidly deplete water and electrolytes in adults as well as infants and children, although the pediatric patients are more susceptible to serious dehydration from this cause. Mild to moderately severe acidosis is common. When 5 to 7 per cent of body weight has been lost, shock may develop, and the probability of shock increases with the severity as well as the duration of dehydration. If the fluid loss is not quickly replaced, anuria may develop and death occur later or death may occur as a result of profound shock. The urgent need is to replace water lost with a solution containing glucose and isotonic sodium chloride or sodium chloride and sodium lactate or sodium bicarbonate. The need for potassium replacement is not great in adults, but it is in infants.[3,14] If diarrhea persists for several days or more, and no food is eaten, potassium depletion does occur. If reliable body weight is available just before onset of the diarrhea, a very accurate determination of the amount of fluid need can be made on the basis of actual weight loss. If not available it is advisable to give a total of 5 to 7 per cent of the body weight as an iso-

tonic solution containing chiefly sodium chloride but also some sodium bicarbonate or lactate. This fluid should contain 5 per cent glucose so that starvation ketosis is corrected. It is usually advisable to give an additional 1000 cc. of 5 per cent glucose in water to allow for water for urine formation. If anuria has developed it still is advisable to give the initial replacement therapy, but after this has been given then the general principles for the treatment of anuria apply.

As long as diarrhea persists, the volume of stools can be measured so adequate replacement can be given to prevent further depletion. If shock persists, blood transfusion or plasma infusion is indicated. If shock still persists after these procedures, a vaso-pressor substance (norepinephrine® or vasoxyl®) should be administered. Prolonged shock unresponsive to plasma expanders alone is apt to occur in patients who have developed a bacteremia.

Anuria or Severe Oliguria from Any Cause

If anuria is due to shock from blood loss or other cause, the shock should be treated by appropriate means (transfusions, saline solutions—as noted under acute dehydration—antibiotics, and ultimately by vaso-pressor substances). Conversely, anuria is common in shock and should be watched for in any such patient.

The etiology of anuria is variable.[12] One cause that may be obscure is exposure to carbon tetrachloride at a time when there has been a simultaneous exposure to alcohol. Acute glomerulonephritis or an acute exacerbation of chronic glomerulonephritis, mercury or oxalate poisoning, sulfonamide crystalluria or toxicity, renal stones with ureteral obstruction, obstruction of the ureters as in cancer of the cervix, hemolytic transfusion reaction, myohemoglobinuria, crush syndrome, shock during or after operation, and massive hemorrhage with prolonged shock are among the most important causes of severe oliguria or anuria. It is not unusual to miss the fact that anuria exists for twelve to twenty-four hours after onset. It is extremely important to establish immediately whether urine is being formed or not after operation or trauma and to determine the etiology as soon as possible. A careful and detailed balance sheet is very useful in the proper management of such cases.

The basic principle of treatment of anuric patients is the supplying of just enough fluids to replace that lost from skin and lungs and any additional fluid lost by vomiting and diarrhea.[6,8,12] The following general rules apply to most cases of anuria:

1. Limit all fluids to 10 cc./kg. (not more than 750 cc./d.) plus whatever external losses occur.

2. Administer a high caloric protein-free feeding such as sugar and butter or a sauce of starch, sugar butter and flavoring substance,[6] or a commercial fat emulsion such as ediol® or lipo-mul® as much as tolerated within limits of total fluid allotment.

3. Allow for a weight loss of about one pound (or 400 to 500 Gm.) per day.

4. Do not administer streptomycin or dihydrostreptomycin. These are cumulative in the face of anuria and hence are seriously neurotoxic to vestibular and auditory nerves.

5. Keep a daily chart of fluid balance.

6. Determination of serum potassium, carbon dioxide content, and chloride, and blood urea nitrogen (or nonprotein nitrogen) on alternate days. Serum sodium determinations are also useful and included if available. If protein nitrogen) on alternate days. Serum sodium decardiogram every day is helpful and can detect evidences of serious hyperpotassemia.

7. When the serum potassium is 7.0 or higher, get daily determinations.

8. When potassium intoxication is established (8.0 mEq./1 or higher) or unequivocal electrocardiographic evidences of toxicity) and especially if paralysis begins to develop, a constant slow 10 per cent glucose infusion with insulin (1 unit per 2 grams of glucose in the fluid) is indicated. This procedure is of benefit only during and shortly after the glucose and insulin infusion. Now more vigilance regarding the potassium level is necessary. Meroney and Herndon[8] have shown recently that calcium administration will abort symptoms of potassium intoxication for many days and avert the need for the artificial kidney in some instances. They recommend the following solution:

Calcium gluconate 10 per cent.....	100 cc.
Sodium bicarbonate 7.5 per cent....	50 cc.
Dextrose 25 per cent in water....	400 cc.
(50 units of regular insulin)	

This solution should be given intravenously by polyethylene tube in a large vein at a constant rate of 25 cc. per hour. The evidence presented is convincing. This will not correct the other chemical abnormalities of uremia and particularly the serious acidosis which develops, so that dialysis may be indicated for this reason.

When diuresis occurs (anytime up to the twentieth day) sodium chloride loss may be considerable. It is necessary to determine the sodium chloride loss and to continue to follow the serum chemistries closely for a while. At least one chemical determination for sodium and chloride during the diuresis is highly desirable. If determinations are not available, a crude estimate

can be made on the basis of an average loss of 30 mEq./l. or about 2.0 Gm. of sodium chloride/l. of urine during this phase. Actually losses can be nearly twice this amount, but at least 30 mEq./l. is a safe minimum replacement.

Anuric patients are prone to develop pulmonary edema, so sodium chloride must be given only to replace losses. If no external losses occur, in general, it is better not to attempt to correct changes in serum sodium, chloride or carbon dioxide. Change in sodium concentration especially can occur from shift of sodium into cells.

By far the most important factor in the improved survival in recent years has resulted from strict limitations of fluids to approximately 10 cc./kg./day in excess of measured losses. It is a mistake not to allow a weight loss of one-half to one pound a day. The indications and experiences with an artificial kidney are reviewed by Swan and Merrill[12] and by Kolff.[6]

Chronic Renal Disease

Parenteral fluid therapy is seldom necessary, but it is worthwhile to emphasize certain features relative to fluids and electrolytes. In the nephrotic syndrome the most important measure is restriction of sodium chloride and other sodium salts. In the phase of extensive edema these patients regularly excrete an excess of salt-retaining hormone.[7] When azotemia develops, variable electrolyte patterns also develop. Then the kidney fails to conserve (or excrete excessive amounts) of sodium salts and sometimes excretes excessive amounts of potassium too. A serious lowering of sodium concentration can occur unless adequate amounts of sodium salts are ingested. For this reason it is unwise to restrict dietary sodium in uremic patients unless laboratory studies are readily available and it has been demonstrated that the patient does not lose salt. This statement does not apply to the edematous non-uremic patient with renal disease. Potassium deficiency may become manifest, so that extra potassium as potassium citrate or acetate in doses of 20 to 60 mEq. per day is needed.

Congestive Heart Failure Complicated by Electrolyte Disturbances

The need for salt restriction and the great benefit derived by relief from edema by use of diuretic agents are well-established clinical observations. Diuretic agents must cause a loss of sodium chloride in addition to water in order to be effective. There are several important sequellae which may occur after an intensive therapeutic program with mercurial diuretics:[10] (1) hypochloremic alkalosis with or without potassium depletion, (2) hyponatremia ("low salt syndrome") and (3) ammonium chloride intoxication with acidosis. Usually only one of these conditions exists at one time, but varying combinations of conditions do occur. The patient usually remains edematous. Often the initial clue that something is wrong is a failure to respond to mercurial diuretics after an initially good response. At other times lethargy, stupor or coma develop. Hypochloremic alkalosis can best be treated by the use of ammonium chloride in tablet form in dose of 8 to 12 grams a day. Failure to correct the abnormality may be due to faulty absorption or inadequate dosage. Ammonium chloride can be given by intravenous injection also as a 1 per cent solution with glucose. This has to be administered slowly (150 cc. per hour) or serious neurological symptoms develop (stupor, shock, coma, convulsions) or even death may occur.[10]

The routine intermittent administration of ammonium chloride (8.0 grams per day for three days with one or two days rest) whenever mercurial diuretics are used not only prevents hypochloremic alkalosis but also enhances diuresis.

If potassium depletion has been found to exist this must be corrected or the alkalosis will persist. Potassium chloride can be given orally. It is noteworthy that digitalis toxicity is made worse by potassium depletion and ameliorated by potassium therapy.

Hyponatremia with serum sodium concentrations of 120 mEq./l. may be due to low salt diet and diuretics but may also occur spontaneously. It must be considered to be a grave prognostic sign. If there has been a prolonged attempt to restrict salt and to use mercurial diuretics, the use of 5 per cent sodium chloride solution administered slowly in amounts from 200 to 300 cc. daily until the calculated deficit is corrected probably will be beneficial. Sodium chloride may actually be harmful or at least of no value in the type where there has been an apparent shift of sodium and chloride into cells without true salt depletion. One can calculate the sodium deficit in the extracellular fluid compartment by the following formula: 142—plasma sodium concentration x 0.6 x body weight in Kg. - mEq. 10.

The amount needed is often from 20 to 40 grams of sodium chloride in an average sized adult. Only one-third to one-half of the calculated amount can be given safely in one twenty-four-hour period.

Hyponatremia can occur in patients with hepatic cirrhosis with ascites. This is particularly true of patients who have just had an abdominal paracentesis. If fluids are not restricted at this time extreme thirst may cause the patient to take a volume of water equal to that lost by paracentesis with consequent dilution of the extracellular electrolytes. Hyponatremia is treated as noted above, but patients may not respond well. This is particularly true of those patients who have not had paracentesis or diuresis and still have hyponatremia. The strict limitation of fluids to 800 to 1000 ml. per day after paracentesis is a useful preventive measure. Paracentesis should not be performed unless there is interference with eating and locomotion because of tense ascites.

Summary and Conclusions

Some of the more serious disturbances of fluid and electrolyte balance which occur in medical practice have been discussed. The greatest possible emphasis has been placed on recording information including up-to-the-minute record of therapy and on preventive measures. Acute and subacute disturbances have been discussed almost exclusively. The administration of fluids parenterally over a long period of time involves many variables; however, the same general principle applies, namely, the prevention of depletion or accumulation of ions. In addition more attention has to be given to vitamins, calories, magnesium, and the mechanical aspects of venoclysis.

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STATE NURSE SCHOLARSHIPS

J. G. Neal, state supervisor of health and physical education and chairman of the state scholarship committee, has announced that the Minnesota State Board of Education has approved 153 nurse scholarships, the first to be granted for the fiscal year July 1954—July 1955. Of the $72,500 available under the law $24,700 remains. Other applications are pending completion.

The awarding of these scholarships marks the beginning of the fourth fiscal year the state nurse scholarship program has been in existence and brings the total number of scholarships awarded to 795. The Minnesota State Legislature in 1951 passed the first nurse scholarship law which provided *needed* financial assistance to students who had the ability to complete an accredited nursing program. The maximum amount of a scholarship for the professional nursing candidate is $600, a practical nursing student $300. In return for this scholarship, the student must practice nursing in Minnesota for one year.

Broken homes, one or both parents deceased, large families, illness and mother on ADC (aid to dependent children) are some of the reasons given and substantiated by the applicants applying for assistance. Many of the students have also worked their way through high school.

FLUID AND ELECTROLYTE BALANCE

Part IV: Surgical Considerations

BERNARD ZIMMERMANN, M.D.

Minneapolis, Minnesota

IN THIS fourth and last section of a symposium on problems in fluid and electrolyte management are to be included the aspects of the problem which seem to be of most frequent interest to the surgeon. It is perfectly obvious, however, that there are no problems in this field which are, strictly speaking, peculiar to the surgical patient. The maintenance of a postoperative patient does not differ in a qualitative way from the maintenance of any other individual. He can not take fluid and nutrition by mouth. The losses sustained through tubes and fistulae require the same type of replacement as those incurred through vomiting or diarrhea. Furthermore the non-specific physiologic consequences of a surgical operation are only a special case in the larger category of physiological derangements resulting from disease and trauma. Much of this paper will therefore consist in amplification of principles that have been introduced in the foregoing papers.[6,7,23]

One of the most significant features of patients who have undergone major surgery is that rather rapid changes occur from one day to the next in fluid and solute losses, metabolic requirements and overall physiologic status. For this reason the complex ready-made solutions designed for routine day to day maintenance of patients by parenteral route are not applicable for use in surgery. Neither are formulae of much practical value. The requirements of a surgical patient may be far in excess of or far less than that predicted for the maintenance of a healthy individual. From the practical standpoint, therefore, the flexibility of treatment necessary for ideal management of patients before and after major surgery is best achieved by the use of simple basic solutions to which requisite ions can be readily added. In the University of Minnesota Hospitals the most frequently used basic solutions are 9 per cent saline solution, 5 per cent glucose solution (plus the combination of these two), and 10 per cent glucose solution. In addition, sterile concentrated solutions of electrolytes are purchased or prepared. These concentrates, which are now commercially available, include sodium chloride, potassium chloride, sodium bicarbonate, sodium lactate, ammonium chloride, calcium and magnesium salts and others. They are added to the basic solutions in accordance with the daily needs. It should be emphasized, furthermore, that it is well to think of daily requirements not in terms of volume of a given solution such as cubic centimeters of "physiologic" saline, but rather as expressed separately in the amount of water, on the one hand, and the quantity of each specific ion (preferably in milliequivalents) on the other.

From the Department of Surgery, University of Minnesota, Minneapolis, Minnesota.

Valuable Measurements

Despite the achievements which have been made during the recent years in methods of assay of the electrolyte concentrations of body fluids and the *in vivo* determination of fluid volume, it is still true that the most valuable data are those which can be obtained with the least elaborate methods. Although it is a truism to emphasize the importance of the clinical appearance of the patient, it is nonetheless remarkable how much information can be learned from clinical data such as turgor of the skin, the facies, the mucous membranes, the existence or absence of abnormal neuromuscular phenomena and the presence or absence of changes in the psyche or sensorium. Moyer, in his book on fluid balance, has done an admirable job of describing in detail the physical findings associated with various categories of fluid and electrolyte disturbance, and has pointed out the degree of accuracy with which diagnosis in this field can be made from clinical findings alone, as well as the frequency with which chemical data may be misinterpreted when the clinical picture is not taken into consideration.[16] One of the most obvious possibilities for such errors was touched upon earlier where it was pointed out that in the absence of a pH determination the interpretation of an elevated CO_2 combining power must depend on the clinician's judgment as to whether the respiratory or metabolic mechanisms are disturbed.[7] Profound derangements of central nervous system function such as coma and seizures are now recognized to be frequently related in a very pre-

dictable manner to alterations in the state of hydration and tonicity of the extracellular fluid.

Exact measurements and recording of intake and output data are necessary for assessment of fluid needs. This frequently necessitates the use of an inlying urethral catheter purely to assure quantitative urine collection. Similar collection must be made of all external losses through tubes and fistulae, and output determinations may occasionally necessitate the weighing of dressings which cover fistulae when no other method of quantitative recovery is possible.

The daily determination of the body weight as applied to fluid administration in surgical patients by Wangensteen has become an invaluable technique for assaying the state of hydration.[22] The interpretation of the body weight depends on the valid assumption that significant changes occurring over short time intervals are mainly due to gains or losses of water. Overall protoplasmic depletion in patients maintained on inadequate nutrition will, of course, over longer periods of time cause reduction of body weight which must not be misinterpreted as the result of negative water balance. Such depletion, however, can be corrected for so that the body weight as an index of hydration can still be useful even in patients carried on parenteral alimentation over periods of many days. There are situations in which the body weight change gives crucial information obtainable in no other way. The most prominent among these is oliguria. Here the body weight is the only reliable basis for deciding whether failure of urine output has resulted from primary renal deficiency or merely inadequate fluid administration. For obvious reasons, treatment in this situation based on an improper assumption as to the mechanism can be disastrous.

Chemical determinations of blood ionic concentrations are of unquestioned importance and the specific syndromes associated with their alterations will be discussed. Again it should be pointed out that, whereas an abnormality in the serum concentrations may of itself be important, the serum level alone is no index of the overall state of excess or depletion of a solute in question. It is feasible, of course, to measure total amounts of electrolytes either by using isotopic tracer technique or by utilizing the concentration in conjunction with various measurements of the extracellular space. These methods, however, are rarely available for use in routine clinical situations. It is hoped that the use of stable substances such as rubidium which can be utilized for the measurement of the total body potassium will in the future make total assays of body constituents feasible in the solution of clinical problems.[2]

Body fluid chemistry need not be limited to determinations applied to the serum or plasma and, it is frequently necessary to determine the composition of secretions abnormally lost from the body. Similarly, urinary concentrations particularly of sodium, chloride and bicarbonate, although frequently misleading, can, when properly interpreted, be of value. Bedside methods are available for determination of these quantities.[19]

The fluid management of surgical patients can be divided for purposes of discussion into four phases: (1) maintenance of a patient who for reason of the surgery or disease is unable to take food or water by mouth; (2) replacement of external losses; (3) non-specific effects related to the trauma incident to surgery; and (4) recognition and treatment of specific syndromes of electrolyte distortion.

Basal Maintenance of Patient in the Absence of the Oral Route

The initial consideration for fluid replacement must be the basal requirement for the human being who for reasons of disease or surgery is denied the oral route of alimentation. The minimal requirements for an adult then must take account of an insensible water loss ranging from 600 to 900 cc. and an anticipated urine output of 1000 to 1500 cc. Insensible losses may be far greater than this particularly under circumstances of fever, prolonged surgery under heavy drapes, hyperventilation, and so forth. The factor of insensible loss is therefore not only variable but highly unpredictable and the ignorance of this quantity is the basic reason for dependence on the body weight in assessing states of hydration. Accurate studies on patients with anuria in whom the control of water administration must be extremely precise have indicated that insensible losses may drop considerably lower than the above-mentioned limits. As little as 400 to 500 cc. of exogenous water may be required.

Large amounts of sodium chloride are not required for maintenance of patients who do not suffer from external losses. The normal kidney can restrict sodium excretion to less than that contained in 1 gram of sodium chloride (17

mEq.) and the insensible water loss (excluding frank sweat) contain only traces of sodium salt. One to 3 grams is therefore adequate for ordinary maintenance. As has already been mentioned, however, this ability of the kidney to conserve in the absence of intake does not hold for potassium ion.[7] Since 30 to 40 mEq. of potassium may be excreted by patients receiving none by mouth or by parenteral route, it is necessary to include in a parenteral regimen at least 2 to 3 grams daily of a salt such as potassium chloride. These losses may be much greater following the stress of major surgery, burns and trauma. A detailed analysis of these requirements is to be found in the paper by Elman on the subject.[11]

Replacement of External Losses

In addition to maintenance amounts of fluid, parenteral administration must include volume-for-volume replacement of water lost through abnormal routes such as tubes and fistulae. The replacement of solutes lost through these channels must take into account the origin of the secretion. In most instances average values can be used for such replacements although occasionally where losses are large, it is necessary to send samples to the laboratory for more accurate analysis.

This is particularly important in fistulae wherein the secretion may be of mixed or undetermined origin. Since the ratio of sodium to chloride in various gastrointestinal fluids varies greatly from that of plasma, their loss will produce not only over-all electrolyte depletion but also profound disturbances in acid-base equilibrium. Thus loss of normal gastric juice which contains more chloride than plasma and very little sodium produces alkalosis within a very short time. Conversely, pancreatic juice possesses sodium concentration which is similiar to that of plasma, but a very small amount of chloride, the remainder of the anions being made up by bicarbonate. It is essentially a solution of sodium bicarbonate. External pancreatic fistulae, therefore, produce acidosis. Bile is also more alkaline than plasma though its sodium-to-chloride ratio is not nearly so high as that of pancreatic juice. Intestinal fistulae, except for high duodenal ones, tend also to produce acidosis because of a relatively greater sodium loss. This we have found to be particularly the case in the occasional instance of a patient who has undergone a previous subtotal gastrectomy which eliminates a major source of chloride coming into the intestinal tract.

Lockwood and Randall have provided us with data based on many more cases than had been previously studied on sodium chloride, potassium on gastrointestinal secretions of all types obtained through tubes or fistulae.[11,18] Their table, which is included in Dr. Flink's paper, is a good one to have available for reference.[6]

To replace the acid secretion from a normal stomach it is usually only necessary to use sodium chloride solutions even though this entails giving an excess of sodium ion. A normal kidney excretes the sodium and acid salts such as ammonium chloride are rarely necessary. In the management, however, of pancreatic, biliary and intestinal fistulae where sodium loss predominates, the administration of sodium chloride is usually not adequate and alkaline replacement solution such as sodium bicarbonate or sodium lactate must be administered. In this connection it must be remembered that the plasma itself, being of a buffered solution of sodium chloride and sodium bicarbonate, is normally alkaline. The administration of sodium chloride is therefore basically acidosis-producing though the normal kidney can compensate for this effect.

Non-specific Responses to Major Surgery

Although an exhaustive treatment of the subject of physiologic response to surgery is beyond the realm of this discussion, a few basic considerations in this field are relevant to a consideration of the common electrolyte abnormalities seen in surgery. It is widely appreciated that following trauma of a degree represented by major surgical procedures a series of metabolic changes uniformly take place which qualitatively are independent of the type of operation. These changes which became apparent with the work of Cuthbertson on experimental fractures have been studied extensively in many clinical investigations beginning with those of Howard and of Albright.[1,5,8] The counterpart of these reactions as seen in experimental animals is found in the experiments of Selye and others who have emphasized the role which the endocrine system plays in their production.[20] Moore has elaborated these investigations and has attempted to put the degree of metabolic response on a quantitative basis.[13] Among these phenomena is the tendency for patients throughout a variable number of days after

surgery to retain sodium ions to an abnormal degree. This means that excessive amounts of salt administered to the patient will not be excreted at a rate even approximating that observable in normal individuals. Consequently, whereas it is almost impossible to produce edema by excessive sodium administration in the healthy human, this will occur in postoperative patients and particularly in those who have had massive procedures or who suffer infection or other complications resulting in a protracted postoperative course.

Concommitant with retention of sodium an abnormally high potassium excretion occurs. This is partly associated with a breakdown of intracellular substance, as demonstrable by a large output of nitrogen in the urine, but balance studies clearly indicate that urinary loss of potassium under these circumstances is greater than that which can be explained by protein breakdown alone. Though it is generally believed that these two phenomena are the consequence of increased adrenal activity, the observations of Ingle on adrenalectomized rats and some observations of our own in adrenalectomized patients undergoing surgery suggest that they can take place even in the absence of alterations in adrenal function.[9] It is our feeling, therefore, that excessive adrenal activity is perhaps only one of several factors in the mediation of postoperative metabolic responses.

A seeming paradox exists in the fact that, whereas sodium and to a slightly lesser extent chloride are avidly retained by the postoperative kidney, the serum levels of these two ions tend to be lowered during the immediate period following surgery. This dilution of the major extracellular electrolytes is illustrated by the course of extracellular electrolyte concentrations in uncomplicated cases, for which mean values are shown in Figure 1. The question we then ask ourselves is where have the sodium and chloride ions gone if they are depressed in the plasma and not excreted in the urine. To some extent this can be answered in light of the additional information that the postoperative kidney also tends to retain water and that there is, therefore, a dilution of the extracellular ionic concentration as a result of water retention alone. Studies of body weight changes, however, and of extracellular space measurements indicate that this by itself is not adequate completely to explain the reduction in extracellular concentration of sodium and chloride. It has been suggested, therefore, that sodium moves into the cell following surgery. Although such a shift almost surely does occur

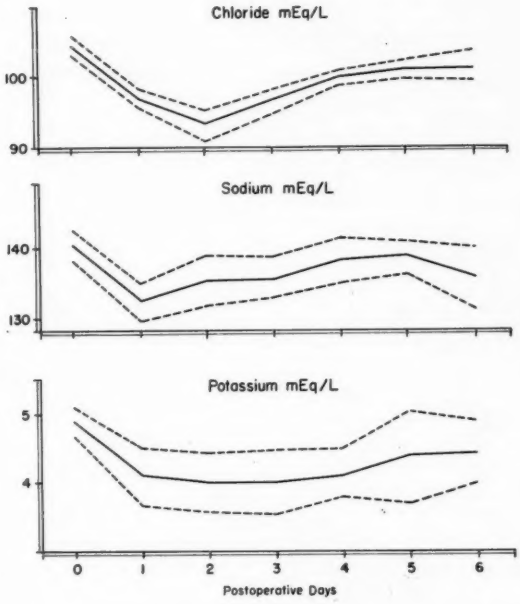

Fig. 1. The course of sodium, chloride and potassium concentrations in the plasma following uncomplicated major surgery (mean values in forty cases).

concommitanly with the loss of potassium from the body, there is still some question as to whether the entire picture can be explained on this basis. Since the reduction of sodium and of chloride are roughly equivalent, this explanation would require that chloride also moved into the cell. It is more difficult to find evidence to support the latter movement. One must admit, therefore, that the apparent translocation of these ions which results from the stress of surgery has not been completely elucidated. It has been pointed out that the bone constitutes a reservoir of sodium constituting perhaps 30 per cent of the total amount of this ion in the body.[3] Changes in the composition of this reservoir have not been studied but it would seem likely that a more thorough knowledge of this aspect of sodium metabolism is in order.[14]

As is shown in Figure 1 the serum level of potassium is consistently reduced throughout the period following surgery when all nutrition is

withheld. This situation was emphasized by Randall and his associates who pointed out that the postoperative course of serum potassium could be significantly elevated by the administration of

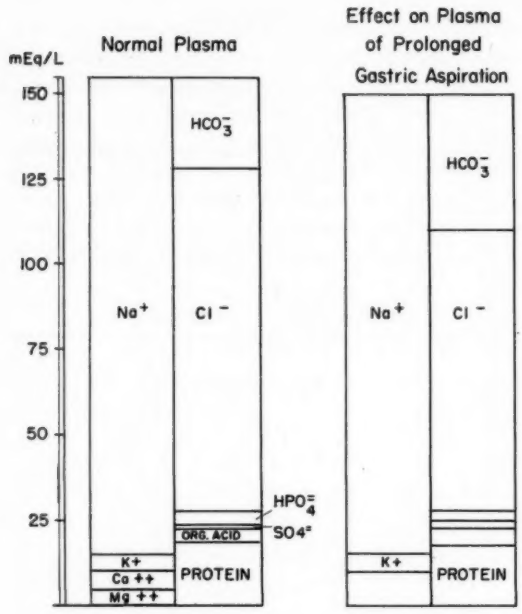

Fig. 2. Hypochloremic alkalosis. Effect on extracellular electrolyte concentrations of several days of nasal-tube suction without adequate chloride replacement. Observe reduction of chloride with expansion of bicarbonate and essentially normal sodium.

potassium salts.[17] Whereas temporary depressions of the potassium such as shown here are perhaps not harmful, the level continues to fall and eventually leads to the characteristic picture of potassium deficiency if administration of this ion is withheld for more than a few days. In order, therefore, to obviate the necessity for giving very large amounts of potassium when the depletion syndrome becomes imminent it is well to give maintenance amounts within a day or two after operation or when adequate urine output has been assured.

Even in the absence of a complete explanation for the deficit in sodium after operation the two facts (1) that the sodium is withheld from the urine while potassium is lost, and, (2) that the serum levels tend to be low, are of great importance in explaining some of the electrolyte complications to which these individuals are subject.

Most Frequent Syndromes of Electrolyte Derangement of Interest to the Surgeon

Since many of the common derangements of fluid and electrolyte balance have already been discussed in the sections dealing with pediatrics and internal medicine, a complete description of these entities is not pertinent at this point. Brief mention, however, should be made of those disturbances which are more commonly seen in connection with surgery and the ways in which the physiological processes associated with stress are related to their occurrence.

Dehydration.—Though dehydration in a precise sense refers to the effects on the body of water loss alone, it most frequently is used to describe the deficiency of water in combination with electrolytes. Pure water dehydration is actually rare. The familiar signs of dehydration are loss of turgor of the skin, sunken eyes and dryness of the mucous membranes. Where controlled observations are possible, the change in body weight, of course, is the best index and the best guide to therapy. It is important that under the circumstances of dehydration the serum and electrolyte concentrations can be elevated or depressed or normal and therefore may give no indication of the over-all deficit in the major ionic constituents. In the absence of fluid intake, water loss almost invariably exceeds electrolyte loss so that it is best to begin hydration with solutions that are dilute with respect to ionic constituents. Subsequent chemical determinations frequently reveal the presence of electrolyte deficit as a more normal state of hydration is approached.

Edema.—Edema as a complication of surgery was frequently seen when "physiological" saline was used rather routinely as a hydrating solution.[10] Following the recognition by Coller and his associates of the tendency for patients to retain sodium in the early postoperative period, the excessive use of sodium chloride was almost universally discontinued and postoperative edema became far less common.[4] As with over-all extracellular dehydration so with extracellular fluid accumulation, the serum levels cannot be expected to give any index of excess of ions such as sodium which may actually be the basis for fluid retention in the extracellular compartment. Here again the familiar clinical signs are of the greatest value though body weight determinations where possible indicate beginning fluid retention long before clinical edema is demonstrable.

Hypochloremic Alkalosis.—One of the most commonly seen derangements of acid-base balance is the alkalosis which is caused by continuous drainage from the stomach of the fluid high in chloride concentration. The serum chlorides are low, bicarbonate is elevated and the sodium may be normal or slightly depressed. It is of interest in these circumstances that the alkaline urine which one might expect as a result of an attempt on the part of the kidney to compensate for an elevated

plasma pH is frequently not seen. The urine pH is, therefore, useless as a guide to the effectiveness of treatment in this situation.[21] The mechanism of this "paradoxical aciduria" is partially obscure but is probably related to the concommitant retention of sodium, the majority of which is being transported into the cells while large quantities of potassium are being removed. As was mentioned above, simple chloride-deficiency alkalosis can usually be treated with sodium chloride without the necessity for the use of acid salts such as ammonium chloride. Such alkalosis is, however, frequently not on the basis of chloride loss alone but is a result in whole or part of potassium deficiency. Figure 2 illustrates the composition of the normal plasma and the distortion produced by pure chloride-loss alkalosis resulting from the use of an inlying gastric tube without adequate chloride replacement.

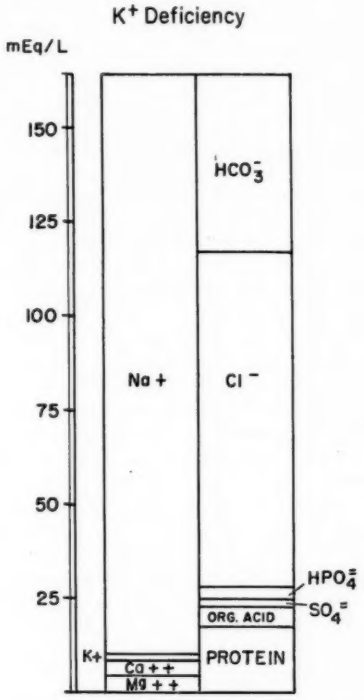

Fig. 3. Potassium deficiency. High duodenal obstruction treated by nasal tube drainage and parenteral therapy including adequate sodium chloride but no potassium salts. Serious hypochloremic alkalosis with depressed serum potassium level.

Potassium Deficiency.—The depletion of potassium ions is common in surgical patients because gastrointestinal secretions contain roughly twice the potassium concentration of plasma but a more important factor is the massive loss of potassium which appears in the urine as a consequence of surgical trauma or acute surgical diseases. A frequent plasma electrolyte picture is that of hypochloremic metabolic alkalosis which is refractory to treatment with sodium chloride

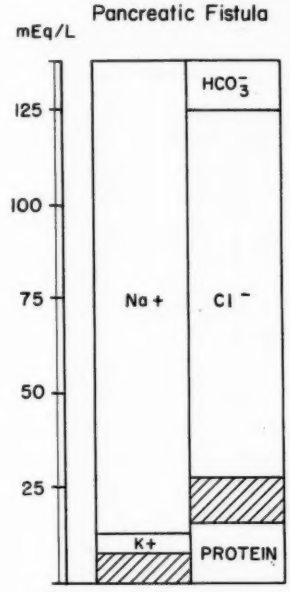

Fig. 4. Hyponatremic acidosis. The result of sodium loss through pancreatic fistula which resulted from drainage of pancreatic cyst. Readily corrected by parenteral administration of sodium lactate or ingestion of sodium carbonate. Note reduction of sodium with corresponding contraction of bicarbonate. Crosshatch = normal values assumed (cations) or determined by subtraction (anions).

or even ammonium chloride. Serum levels of potassium are usually depressed but may not be so and so-called "refractory alkalosis" is adequate indication for intensive treatment with potassium salts. The clinical signs are weakness or paralysis and frequently paresis of intestinally motility can be shown to be on this basis. The tetany (Trousseau sign, Chvostek sign, carpopedal spasm) which accompanies severe akalosis is occasionally seen. Disorientation is frequent. It is important that in early stages of potassium depletion hyperactive speech and irrelevant conversation may indicate the necessity for investigating potassium depletion. Electrocardiographic changes have been described in the previous sections as have the types and routes of treatment.[6] The electrocardiogram and CO_2 combining power in our experience are the best guides to effectiveness of therapy. Figure 3 shows the fluid and electrolyte picture in a young woman with high intestinal obstruction who had been treated for a period of over two weeks with massive amounts of sodium chloride and ammonium chloride without potassium ion. Vigorous administration of potassium chloride was all

that was needed to return her acid-base balance to normal. In postoperative patients we have most frequently seen the potassium depletion syndrome in those patients who have suffered prolonged debilitation or

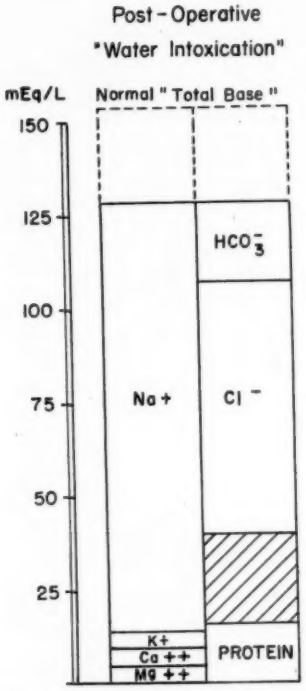

Fig. 5. Water intoxication. Seventy-one-year-old hypertensive woman treated with low salt diet prior to right colectomy; 3000 cc. 5 per cent glucose on operation day and 3500 cc. 5 per cent glucose without sodium chloride on first post-operative day. Seizures occurred 30 hours after operation. Diagram shows results of blood chemical determinations at time of seizures. Observe reduction of sodium and chloride, i.e. over-all electrolyte "dilution."

interference with gastrointestinal function prior to surgery. As one might anticipate, it is also particularly common in patients undergoing a second operation within two to three weeks of the first during which interval the negative potassium balance resulting from the initial surgery has not been completely restored.

Hyponatremic Acidosis.—Figure 4 illustrates the metabolic acidosis which can result from pure sodium loss. These measurements were made on a man who developed external pancreatic fistula following operation for pancreatic cyst. Daily administration of sodium lactate is adequate to prevent acidosis under circumstances such as these and in patients who do not have fistulae involving the intestinal tract itself, oral administration of sodium bicarbonate is frequently feasible.

Dilution: Water Intoxication and Low Sodium Syndrome.—Among the most dramatic clinical emergencies associated with abnormalities of electrolyte metabolism are those which have as their basis a severe depression of extracellular sodium concentration.[24] In Part I of this symposium the hypothesis of Darrow and Yannet was mentioned and it was pointed out that the relationship between intracellular and extracellular water depended on the concentration of extracellular sodium. Since water moves into the cell in the face of lowered sodium concentration of the extracellular fluid, the effect on the intracellular volume is the same whether the dilution is produced by addition of water or by abstraction of sodium from the extracellular compartment. The cells of the central nervous system are particularly sensitive to this type of volume change. The clinical picture is characterized by profound central nervous system disturbances and frequently by seizures. In the cases of "water intoxication" which have been studied in this hospital, the symptoms were nearly always between twelve and thirty-six hours after surgery. Reference to Figure 1 shows that this is the period when the usual postoperative drop in serum sodium concentration is maximal. These instances represent then a sort of exaggeration of a normal postoperative phenomenon. Many of the cases studied received more salt-free glucose solutions than they should have. Others were given only usual or even small amounts. In any case, none of the patients in the series received amounts of water which would produce symptoms in normal individuals. Surgery, therefore, renders patients highly susceptible to this complication. Serum sodium levels when drawn at the time of symptoms are nearly always below 125 mEq./L and in many instances can be measured below 115 mEq./L. Because of the possibility of this complication, we feel now that it is not wise ever to give nothing but salt-free glucose solutions during the first two days after operation and even when no external losses occur it is advisable to give 4.5 to 6 grams of sodium chloride per day during this period. A similar picture associated with profound serum sodium depression has frequently been noted in patients undergoing surgery for acquired heart disease particularly following the operation of mitral valvulotomy.[15] These patients have characteristic impairment in water excretion and are usually prepared for surgery with long periods of sodium restriction. In view of the frequency of this complication then, it appears inadvisable to maintain patients on such severe sodium restriction when mitral surgery is contemplated. Treatment of these conditions requires strict limitation of administered water and administration of hypertonic solutions and 2 per cent saline is most frequently used. Figure 5 illustrates the usual electrolyte picture in water intoxication, the only consistent findings being a reduction in the concentrations of all the major extracellular ions.

Hypernatremia.—A relatively rare but serious complication has been recognized in a few patients who demonstrate a pathologic tendency to retention of sodium in the face of otherwise normal renal function.

It occurs in two general types of conditions; certain kinds of renal injury, and occasionally lesions of the central nervous system involving either the frontal lobes or the hypothalamus. It was first described by Luetscher as a complication of sulfathiazol poisoning of the kidneys. It is now recognized that it can occur following any type of renal damage. Generally it appears to be a stage in the recovery from renal injury and thus hypernatremia is occasionally seen during the diuresis phase following instances of so-called "lower nephron syndrome." The cases in which the central nervous system has been implicated have usually been seen following neurosurgery particularly pre-frontal lobotomy. Serum sodium levels of over 190 are not uncommon. Clinical signs include profound central nervous system depression and occasionally neuromuscular phenomena such as athetoid and choreiform movements of the extremities. Death is likely to occur. Little is known about the treatment except for the obvious procedure of withholding of sodium salt and administering as large amounts of salt-free glucose solution as can be tolerated. Even with such a regimen it may be many days before the serum sodium level comes down to normal and the scant sodium excretion despite seriously elevated sodium levels can be truly remarkable.

The conditions which have been described above are, of course, pure situations but in clinical practice frequently occur in combination. By no means all the possible electrolyte complications have been described. Unfortunately the surgeon must frequently be concerned with the delicate problem of managing patients with anuria. This subject has been dealt with in Dr. Flink's discussion of the problem as it arises in internal medicine, and the method of management is in no way different when the problem arises in surgical patients.

Summary

Problems of maintaining and correcting fluid and electrolyte balance are essentially the same whether encountered in the practice of Internal Medicine, Pediatrics or Surgery. Because of the highly variable and rapidly-changing physiologic status of the postoperative patients, however, it is our feeling that complex or "ready-made" polyionic solutions are not as useful in this field as are simple basic solutions to which ions in concentrated form can be added.

Certain syndromes of electrolyte distortion are rather commonly seen in surgical patients and the manner in which their development is related to the altered physiological processes which characterize the response to surgery has been discussed.

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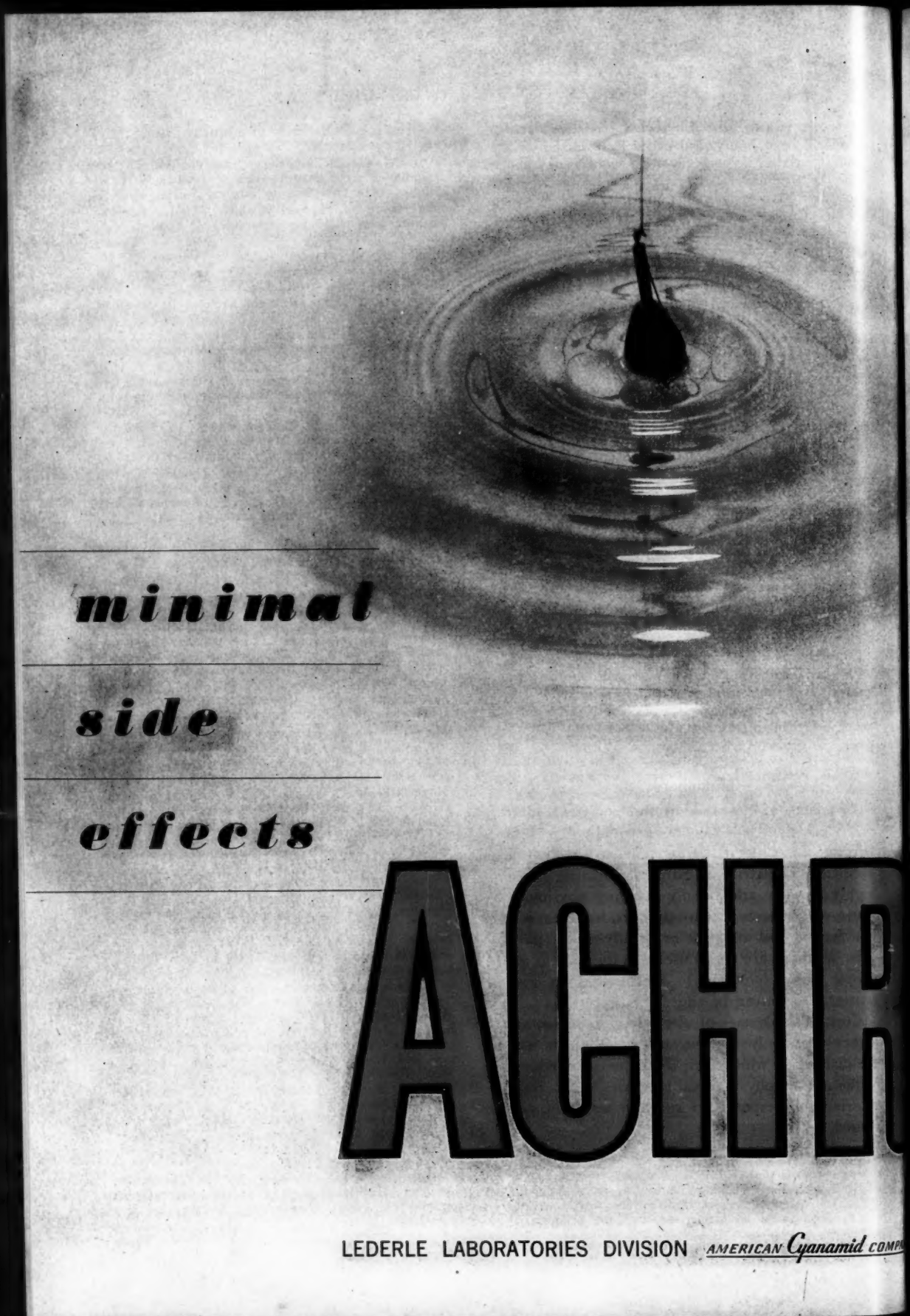
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Seminar

BRUCELLOSIS

JAMES D. TOWNSEND, M.D.

Saint Paul, Minnesota

Although clinical descriptions believed to be compatible with brucellosis are recorded as far back as Hippocrates in 450 B.C. actual discovery of the organism was made by David Bruce in 1886. Because the disease was so prevalent on the island of Malta, it caused marked morbidity among the British troops stationed there. To meet this problem, the Mediterranean Fever Commission, headed by Bruce, was formed in 1904 to investigate its cause, and possible means of prevention. During the next two years the work of this commission was monumental. A member of the commission, Dr. T. Zammit, accidentally discovered that goats' milk was heavily infected with Brucella organisms. Following this the incidence of the disease was greatly reduced by forbidding the use of raw goats' milk on the island.[16,20]

The first authentic case of brucellosis originating in the United States was reported from Washington, D. C., in 1905.[20] Minnesota did not report its first case of human brucellosis until 1927. There was a steady increase in the number of cases reported each year until 1947. This incidence has since declined.[8,13]

Etiology

There are three species of the genus Brucella, all of which may cause the disease in man. They are Brucella abortus, Brucella suis, and Brucella melitensis, their primary habitat being cattle, hogs and goats respectively. Morphologically they are very small, non-motile, Gram-negative bacilli or coccobacilli. The melitensis variety is most invasive and causes the most severe infection in man, while abortus causes the least severe infection. Suis lies between the other two in pathogenicity.[16,33]

Epidemiology

There are only three important means by which Brucella infection is transmitted to human beings. These are:

1. Ingestion of infected raw milk or other unpasteurized products.
2. Contact with infected animals, or their flesh or products of conception.
3. Contact with live cultures during the course of scientific work.[16,32,33]

In the United States brucellosis is the most common milk-borne disease, and it is the most common disease transmitted from animals to man.[3,16]

Raw milk is the major source of infection in man except in those occupational groups exposed to the above means. It is interesting that there is evidence that the normal skin is a more vulnerable portal of entry for the organism in man than is the digestive tract. However, the disease is primarily an occupational one as indicated by these figures reported by Jordan.[21]

Annual Infection Rate per 100,000 (Iowa 1942-1945)

1.	Packing-house workers	271.5
2.	Veterinarians	250.0
3.	Farm workers	43.0
4.	Merchant, professional	3.3
5.	Farm wives	2.2
6.	Housewives	1.4

Because of these occupational factors most cases occur in men. In Minnesota and Iowa about three-fourths of the cases occur in adult males.[3,33,37] Brucella abortus is responsible for about three-fourths of the cases in this state and we are fortunate in this respect since it is the least pathogenic strain. Within recent years however, the incidence of both melitensis and suis infections have been increasing here. Presumably they are acquired from Iowa. Brucella suis is the most common strain encountered in human cases in Iowa.[13] It is interesting to note that Brucella melitensis is being harbored by hogs, instead of goats or sheep.[22] In addition Brucella suis occasionally infects cows and when it does, rather severe milk-borne epidemics may result because of its more invasive nature. It is unusual for a milk-borne epidemic to occur due to Brucella abortus.[3]

Children are apparently more resistant to the disease than adults.[32,37] Some authors point out that the apparent low incidence in infants and children may be due to failure to consider the disease in the diagnosis of many unexplained illnesses in childhood.

The geographic distribution of the disease in man roughly parallels infection in goats, swine, cattle and sheep throughout the world, but ac-

From the Department of Medicine, University of Minnesota, Minneapolis, Minnesota, and the Ancker Hospital, Saint Paul, Minnesota, William F. Mazzitello, M. D., medical service editor.

curate statistics are not available. Some areas show an extremely high incidence, for example, the rural area about Cordoba, Argentina, in which 77.9 per cent of persons were found to be positive reactors. In Minnesota 20 per cent of the rural population has been reported to give positive intradermal tests for brucellosis.[33] In the United States, Iowa has the highest incidence of reported cases with 5.9 per 100,000 per year. Minnesota ranks seventh with 3.4 cases per 100,000.

In 1951, Iowa, Wisconsin and Minnesota reported about one-half of the total number of cases in this country. The predominent strain involved depends upon the livestock population of the area. In Iowa hogs are the most numerous farm animal and Brucella suis is isolated from 63 per cent of human cases; cattle are more abundant in Minnesota and Brucella abortus is found in 86 per cent here; in Mexico where goats are plentiful, Brucella melitensis is recovered from 95 per cent of the cases.

The disease is arbitrarily classified as acute from onset to three months, subacute from three months to one year, and chronic when the duration of illness is one year or more. There is some variation in opinion regarding the frequency with which the disease becomes chronic. Harris believes that at least 90 per cent of the cases in the United States are chronic. Of sixty-five patients followed by Spink, 46 per cent had subjective complaints longer than one year, but only 26 per cent had objective evidence of continuing disease. In addition only 12 per cent were disabled for work longer than one year.[33]

A critical analysis of the chronicity of this disease yields the figures shown in Table I taken from Feig.[8]

TABLE I.

Duration	Jordon & Borts (1947) 108 cases Cases	%	Spink et al (1951) 48 cases Cases	%
3 mo. or less	54	50	33	69
3-6 months	14	13	11	23
7-12 months	19	18		
1 year and more	21	20	4	8

The well documented tendency for these patients to have vague symptoms persisting long after the acute disease subsides, plus the difficulty of making a conclusive diagnosis at this stage, combine to make this problem difficult to evaluate.

Clinical Manifestations of Acute Brucellosis

Simpson has said that "no disease, not excepting syphilis and tuberculosis, is more protean in its manifestations."[29] Harris, in his volume on brucellosis, devotes 131 pages to its symptomatology. The disease has been proved capable of infecting almost every tissue in the body. From the foregoing it will be seen that an exhaustive discussion of the symptoms of brucellosis is impossible here.

However, it is our purpose to describe the typical clinical course of acute brucellosis. Howe and his co-workers[19] had an excellent opportunity to observe the acute disease in seventeen laboratory workers accidentally infected with brucella suis and melitensis. Almost all of these cases were confirmed by actual cultivation of the organism. All of these patients had been given "a Brucella vaccine" prior to exposure, but whether this altered the course of the illness could not be stated. In these patients the incubation period varied from twenty-four hours to seven days, in all but one. This one patient's symptoms were characterized by a gradual increase in severity for a period of one month. The symptoms were not pathognomonic. Fatigue was the chief symptom in all cases. Joint pain and aching muscles were prominent as was headache. One-half of the patients had at least one severe, shaking chill. Nonproductive cough, nausea, vomiting and photophobia were common. In four cases diarrhea occurred. Fever in these patients was extremely variable. The highest temperature elevations were usually found in the late afternoon and the severity of the disease seemed to vary directly with the degree of fever. With the exception of fever, there were no physical signs in these patients. The disease process did not localize in any organ system.

The acute disease due to Brucella abortus does not vary significantly from this in its symptomatology. Regardless of the species of the causative organism, the physical examination may be negative or it may reveal splenomegaly (one-third of cases), cervical (one-half of cases), and axillary lymphadenopathy. The duration of the symptoms is, in general, less than six months, and it may terminate in a state of well-being in a few weeks.[32]

An analysis of the signs and symptoms in thirty-five culturally proven cases due to Brucella abortus was carried out by Hall and these are listed in the accompanying tables.[14]

TABLE II. INCIDENCE OF VARIOUS SYMPTOMS IN CASES STUDIED

	Per cent
Weakness	94
Sweats	89
Malaise	77
Anorexia	77
Chilliness	74
Headache	74
Backache	63
Chills	63
Pain in Neck	51
Joint Pain	31
Nervousness	31
Insomnia	31
Cough	23
Diarrhea	14
Abdominal Pain	11
Constipation	6
Neuralgia	6
Pleural Pain	3
Dysuria	3
Testicular Pain	3

TABLE III. INCIDENCE OF PHYSICAL SIGNS IN CASES STUDIED

	Per cent
Fever	100
Lymphadenopathy	68
Weight Loss	51
Splenomegaly	43
Hepatomegaly	34
Abdominal Tenderness	11
Tender Spine	6
Neurologic Changes	6
Rash	3
Orchitis	3
Rales	3
Conjunctivitis	3
Rhinitis	3
Dicrotic Pulse	3

Because of the extreme variability of the disease certain manifestations deserve further comment.

1. *Fever* may at times be as high as 106-107°. A peculiar thing about the fever of brucellosis is that frequently the patient will not complain of fever or look feverish but will be found to have a temperature of 101 to 103°. Sweating may be drenching in character and often has a peculiar fetid or "mousy" odor.[16,29]

2. *Arthralgia* and muscular pains are prominent features of the acute form. Aching pain in the lumbar spine and long bones is common. Suppurative osteomyelitis occurs but is more likely to do so in the chronic phase of the disease.

3. *Central nervous system* symptoms may dominate the clinical picture from the onset. Practically all possible central nervous system signs and symptoms have been described. Emphasis has been placed on the predominance of meningeal symptoms in the majority and on the frequency of cranial nerve involvement, especially the 8th cranial nerve.[25]

De Jong[6] states that "uncomplicated brucellosis practically always shows some nervous system symptoms, apparently due to the action of a bacterial toxin which may have a special affinity for the central and peripheral nervous system."

4. *Gastrointestinal* symptoms frequently include anorexia and constipation. Simpson states that the latter is "practically invariable and parallels the severity of infection." Abdominal pain is often troublesome. In 125 cases reported by Hardy, forty had abdominal pain and in ten it was the chief complaint.

5. *Respiratory* symptoms may be an outstanding feature of the disease. Cough with mucoid or muco-purulent sputum is frequent in the first few weeks and may persist for many months. Chest x-ray may be negative or reveal peribronchial infiltration, hilar infiltration and patchy pneumonic areas. Hemoptysis is occasionally encountered.

It should be pointed out that not all persons whose tissues are invaded by Brucella develop the illness described above. In fact a great many of them apparently suffer no recognizable illness at all. This is supported by the fact that about 20 per cent of persons in rural Minnesota are found to have positive intradermal tests, yet there is no history of acute brucellosis.[31] It is probable, then, that a considerable number of patients have the chronic form of the disease that is not readily detected.

Although there is a greater tendency for the chronic disease to produce localized complications, the majority of them do not. Even in this phase brucellosis is marked by a multitude of symptoms in comparison to the paucity of physical findings. The rather vague symptoms include weakness, generalized aches and pains, anorexia, constipation and nervousness. The nature of these symptoms makes it apparent that confusion of this disease with psychoneurosis is likely. Complications which do occur, however, include spondylitis, orchitis, meningitis, encephalitis and endocarditis.[30,31]

Pathology

Although the pathological features of brucellosis have not been completely elucidated, certain facts stand out:

1. The organisms seem to localize and multiply intracellularly in phagocytes of the reticulo-endothelial system. Accordingly, the liver and spleen are often the site of most marked changes.

2. The most frequently occurring lesion is a granuloma which is not specific but bears much resemblance to the tubercle. Caseation does not usually occur. Microscopically the lesions show central areas of epithelioid cells surrounded by lymphoid cells. Although giant cells may occasionally be seen, they are not so prevalent as in the typical tubercle.[10]

3. As might be expected in this disease, the pathological findings are extremely variable. At times there may be only slight stimulation of the reticulo-endothelial system, or there may be no demonstrable lesions. On the other hand, extensive changes attributed to brucellosis have been described in every organ in the body.[16]

Diagnosis

In a disease with such protean manifestations it is unfortunate that no uniformly satisfactory means of establishing the diagnosis exists. Harris states that "the diagnosis of brucellosis may be among the most difficult tasks in medicine."

The history can do no more than suggest the possibility of this disease. A source of exposure is important, however, although it is not always obtained. Suspicion should be multiplied when dealing with a packing house worker, veterinarian or farmer. The physical examination is often surprisingly normal. Anterior cervical lymphadenopathy is observed in approximately one-half of the cases and splenomegaly in one-third.[34] Other findings may be noted depending upon the particular localization of the disease. They are less common in the acute form. Since the history and physical examination are inconclusive, further information must be sought from laboratory tests.

1. Culture of the organisms from blood or other sources offers the only absolute proof of the diagnosis. However, this procedure presents many difficulties. First of all, Brucella is one of the most difficult of all bacteria to isolate. Special media is required and incubation should be carried out under 10 per cent CO_2 concentration. Bacto-tryptose agar is the media now widely employed with considerable success. Although the melitensis and suis strains grow readily under aerobic conditions, abortus requires 10 per cent CO_2 and is most difficult to isolate. Cultures should be incubated for at least one month. In addition to this difficulty, bacteremia is often fleeting and unpredictable, so that the success of a blood culture may depend on pure chance. Cultures are more successful in the acute disease because bacteremia is more frequent and persistent. Nevertheless, positive blood cultures have been obtained from persons who are clinically well and have no frank history of a previous acute episode of brucellosis.[42] A case in point is furnished by Hall in a survey of families of patients with proven brucellosis. One fifteen-year-old girl, with no recognizable illness, was found to have a titer of 1:60 for brucella and the abortus strain was isolated from her blood.[14]

Cultures of spinal fluid, bile, feces and prostatic fluid may be undertaken if the clinical situation seems to warrant it. Positive cultures from sternal marrow have been reported while venous blood was negative. This simple procedure offers the additional advantage that histologic study may reveal the nonspecific granulomatous lesion of Brucella infection.

It should be pointed out that if routine rather than special cultural methods are used in the search for Brucella, the chances of isolating the organism are slight.

2. There is general agreement that next to culture of the organism, the blood agglutination reaction is the most important laboratory test. A titer of 1:100 or over is usually regarded as significant and indicative of past or present infection with Brucella. There is no titer of agglutinins that is specific for the active disease. The higher the titer, the more likely it is that the organisms can be isolated from the blood.[5] Usually the agglutination titer in culturally proven cases is 1:160 or over and in 90 per cent it is 1:320 or more. During the first week or two of acute brucellosis, agglutinins may be absent.[8] They may appear in the blood at any time from a few days to a few weeks after the onset of illness.[29,42] After recovery from the disease, agglutinins may persist for years or they may disappear completely. In performing the test it is necessary to carry the dilution of serum far enough so that the prozone phenomenon is avoided. If this occurs, agglutination may not begin until a titer of 1:160 or 1:320 is reached. In rare instances blocking antibodies may be present and the usual agglutination test will be negative.[12,30]

If this is suspected it can be detected by cen-

trifugation of the serum-antigen mixture, or other special tests.[15] Reports of positive cultures in the presence of negative agglutination tests are frequent in the literature.[5,11,16] However, Spink states that a negative agglutination test in bacteriologically proven brucellosis is unusual.[8] Another pitfall is that although the agglutination reaction may become negative upon recovery, a totally unrelated illness may cause an anamnestic reaction and agglutinins are again discovered. Furthermore, the presence of Brucella agglutinins is not specific and cross agglutination occurs in serum from patients with tularemia, cholera and those having received cholera vaccine. The frequency of cross reactions in other conditions is probably low.[9,30] If the intradermal test is to be carried out it should be deferred until all information from the agglutination reaction has been secured, because agglutinins may be stimulated to develop. However, some authors have reported that when intradermal testing does provoke a rise in titer above 1:80 this indicates previous or current infection.[2,23]

3. According to Harris, "the significance of the intradermal reaction is, in general, comparable to that of the tuberculin test." Two preparations are in common use for the performance of this test. Bacterin (and similar preparations) is a heat killed suspension of Brucella abortus organisms. It is a more sensitive antigen although its use entails the risk of an occasional violent reaction with skin necrosis. Brucellergen is a protein nucleate fraction of Brucella organisms and it is less sensitive as well as less likely to cause a severe skin reaction.

A positive skin reaction cannot be used as evidence of Brucella infection without clinical and other laboratory evidence. A negative reaction can occur in the presence of a positive culture and therefore cannot be used to rule out brucellosis. This occurs in cases of Brucella endocarditis and its mechanism is perhaps similar to the anergy found in cases of miliary tuberculosis.

Because of the inconclusive nature of this test, plus the fact that 20 per cent of patients from rural Minnesota give positive skin reactions, the intradermal test has been abandoned as a diagnostic procedure at the University of Minnesota Hospitals.[32]

Most authors especially discourage the use of the skin test to "confirm" the diagnosis of chronic brucellosis in patients who have a history of exposure plus vague symptoms compatible with psychoneurosis.

4. The opsonocytophagic test, which measures the phagocytic power of the leukocytes against Brucella organisms, has also been abandoned by most authors as having no particular usefulness in the diagnosis of brucellosis.

5. The routine laboratory studies offer only ancillary aid in the diagnosis of this disease. The white blood count is usually normal or below normal. Rarely it may be increased. A relative lymphocytosis is usual. The sedimentation rate is normal or elevated and is of no diagnostic value.

Differential Diagnosis

Harris lists thirty-nine diseases in his discussion of the differential diagnosis of brucellosis. These range from psychoneurosis to African trypanosomiasis and Filariasis bancrofti. Perhaps the most commonly encountered problems are in the differentiation of brucellosis from typhoid fever, infectious mononucleosis, and infectious hepatitis.[10,34]

The similarity between infectious mononucleosis and acute brucellosis can be quite striking and merits further discussion. Fever is common to both diseases, as is lymphadenopathy and splenomegaly. A normal or decreased white blood count may be encountered in both conditions together with a relative lymphocytosis. Atypical lymphocytes may occur in brucellosis as well as infectious mononucleosis. In addition, patients with acute brucellosis may have a positive heterophile test. However, the antigens causing this reaction in brucellosis may be absorbed out with guinea pig kidney, and this of course provides a means of differentiating between the two conditions.[8]

Prognosis

Writing about acute brucellosis caused by Brucella abortus, Spink stated that "the duration of the disease, in general, is less than six months and some cases terminate in a state of well-being in a few weeks."[32] Harris, referring to brucellosis in general, believes that it may not be a self limited disease and that it is impossible to estimate the percentage who fail to recover completely, and are subject to repeated relapses. He believes that "the duration of the infection may be limited only by the life span of the individual."

The great majority of cases of acute brucellosis

survive as indicated by the case fatality rate for the U.S. from 1942-1949 which was 1.5 per cent. For the same period the rate in Minnesota was 0.2 per cent.[8] The mortality rate in culturally proven cases at the University of Minnesota is about 3 per cent.[32]

Treatment

Prior to the advent of the newer antibiotics, the therapy of brucellosis was eminently unsatisfactory. As each new drug becomes available its usefulness in brucellosis is evaluated.[24,27,35,38,41] For a time the combination of streptomycin and sulfadiazine was found to be most effective.[39] Aureomycin, terramycin and chloromycetin have all been found equally effective in promoting prompt relief of acute symptoms. However, the combined clinical and bacterial relapse rate of 69 per cent makes it obvious that these medications are not curative.[24]

At the present time combined treatment with 2 gms. of dihydrostreptomycin and 3 gms. of aureomycin daily for twelve to fourteen days has given results far superior to any previous method of treatment.[17] In cases with localizing complications the therapy is continued for twenty-four days except that dihydrostreptomycin is reduced to one gram daily. Of sixty cases treated in this manner by Herrell and Barber, there was only one symptomatic relapse and two bacterial relapses. The follow-up period was from three to twenty-four months. No toxic effects of the drugs were encountered.[36] Other investigators have not had such favorable results with this combination.[14]

The fever and toxicity of brucellosis can be controlled quickly with ACTH, but bacteremia persists. Chronic cases are unaffected and granulomas in the liver and bone marrow remain unchanged. The only indication for ACTH in brucellosis is felt to be for control of serious toxic symptoms while antibiotic therapy gets under way.[18]

In the past treatment of the more chronic cases of brucellosis with vaccine therapy has been common. Some investigators believe that this involves a process of desensitization and others contend that a state of immunity is produced which promotes destruction of viable Brucella. In any case, results of this therapy have been extremely variable.[30] It is still advocated in selected cases of chronic brucellosis when response to antibiotics has been disappointing.[28]

Prevention

Vaccination of human beings does not appear to be effective. Pasteurization prevents the milk-borne transmission of brucellosis to human beings. The majority of infections at present, however, result from direct contact with infected animals or their tissues. The eradication of this means of infection is more difficult and is based upon the elimination of infected animals. To accomplish this these animals must be detected and slaughtered. If such a program could be carried out, brucellosis would soon cease to be a problem. Two major obstacles stand in the way. The first is that practical tests for the diagnosis of brucellosis in animals are not capable of detecting the infection in every instance. The second, and more important, is that no uniform nation-wide program of test and slaughter has been instituted. Until these obstacles are overcome we shall continue to be confronted with the problem of brucellosis in clinical medicine.

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PRESCRIPTION IS WRITTEN FOR "PHYSICIAN-DOLDRUMS"

A prescription has been written by a Philadelphia radiologist which points toward a cure for that virus sometimes contracted by physicians at their many scientific meetings—a disease called "The Doldrums."

The virus is caught from hearing too many long-winded speakers read dry, poorly prepared medical papers.

Offering the suggested therapy is Dr. Robert P. Barden. His prescription is presented in an editorial in the current issue of *Radiology*. The title is, "So You Are Going To Present A Scientific Paper?"

When a doctor arises to read his pet scientific paper, writes Dr. Barden," . . . . from the standpoint of education, entertainment and personal promotion, this may be a catastrophe."

Here are some ingredients in Dr. Barden's prescription:

1. Finish the paper before the deadline. If allotted 20 minutes, speak for 17.
2. Never say all you know, and retire from the podium while your listeners are hoping for more.
3. Talk in headlines. Explain just enough to make the main thought clear.
4. Be simple in concept; terse in expression; logical in progression from one idea to the next.

Concluding, Dr. Barden writes: "After rehearsing the presentation alone several times, stop-watch in hand, try it on one of your colleagues—or even your wife."

Laboratory Aids to Medical Practice

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NECROPSY: ITS RELIGIOUS IMPLICATIONS

DUANE N. TWEEDDALE, M.D.
Rochester, Minnesota

PHYSICIANS occasionally encounter a situation wherein the family of a deceased person objects to necropsy on religious grounds. To meet this challenge and secure permission for necropsy, the physician must be armed with convincing arguments. In view of the sparse literature on the subject and the many misconceptions that exist, the information herein was compiled. The problems will be discussed under the various churches.

Catholic

Necropsy is fully accepted by the Catholic Church, the procedure being mentioned in its writings. In the "Ethical and Religious Directives for Catholic Hospitals," the postmortem examination is sanctioned when done under proper safeguards, which means that proper respect and no desecration be shown to the body. The examination should be made under supervision and to promote science.

Catholics, according to Canon Law 1203, are opposed to cremation. This in no way has reference to necropsy but was mainly intended as a rebuff to certain groups and factions which, at one time, advocated cremation as a means of completely destroying the body and soul so as to avoid payment for mortal sins by such destruction.

In "Moral Limits of Medical Research," Pope Pius XII has expressed indirectly his acceptance of necropsy.

Jewish (Orthodox and Conservative)

The Orthodox and Conservative branches of the Jewish Church are fairly uniform in opposition to necropsy. The basis for their reasoning lies in volume Baba Bathra of the Talmud, which is the book of interpretation of old Biblical laws used extensively by the Jewish people. This volume states that all mutilation of the corpse is prohibited because it involves disrespect to the dead. When buried according to Jewish law, every part of the body must be interred, including even the smallest piece of tissue.

However, there are some exceptions to this general dictum opposing necropsy. These have been summarized from the classic work of Rabbi Leopold Greenwald* as follows:

1. It is most positively prohibited to perform necropsy on bodies of Jewish people or to hand these bodies over to students to dissect the same into sections; these sections will not receive Jewish burial. (This also applies to limited necropsy.) Even if one slew himself, or in the case of sinners who did not repent their sins, this still holds true. However, great authorities have ruled that if one makes the declaration during life that he desires a postmortem examination of his body after demise, then that is permissible.
2. When a governmental law states that all must yield to postmortem examination and the lives of Jews are endangered because of such dictatorship, then necropsy is permissible.
3. If one dies of an unusual disease and physicians desire dissection of the body in order to find some cure for those following him, this is also forbidden.
4. However, if there is before us a diseased person with the same disease of which one died and the physicians make the postmortem examination for the sake of finding a cure for the living one, then the Hachtam Sofer permits it.
5. If the sick one consented, before his demise, to re-

This is the twentieth in a series of editorial reports sponsored by the Minnesota Society of Clinical Pathologists and designed to foster closer relationships between clinicians and pathologists. This paper results from work done by Dr. Tweeddale as a resident in pathology, Lincoln General Hospital, Lincoln, Nebraska.

*Personal thanks and gratitude are extended to Rabbi A. Aaron Segal of Rochester, Minnesota, for translation and summarization.

ceive a postmortem examination or sold his body for such a purpose, it is permissible.

6. If a person died of a hereditary disease and if competent physicians declare that there is hope to save the children of the dead person if a postmortem examination is performed, and if they would examine the cause of such death and would bury all the organs after such examination, then this is permitted.

7. When one is killed and it is desired by means of postmortem examination to find evidence, it is permitted.

Jewish (Reform or Liberal)

In sharp contrast to the beliefs just presented, this faction of the Jewish Church is in favor of necropsy. Their reasoning is as follows:

1. In volume Ketubot of the Talmud a dictum states that any law of the Talmud may be violated for the sake of saving human life except in case of incest, idolatry and murder. Members of this branch of the Jewish Church consider this dictum apropos to the question of necropsy, whereas the Orthodox and Conservative branches do not.

2. The Talmud also states that if one is sick and fails to call a doctor he deserves to die. The Reform group applies this to anything serving to promote well-being and cure the ill, even to necropsy.

3. This group tends to be more liberal in thoughts and ideas, as emphasized by recent Jewish scholars. Dr. Jacob Z. Lauterbach, one of the outstanding authorities on the Talmud, has written in favor of necropsy.

Christian Science

Opposition to necropsy among Christian Scientists is as basic as is their belief. However, one circumstance occurs under which a postmortem examination is sanctioned. Mary Baker Eddy stated, "If a member of The Mother Church shall decease suddenly, without previous injury or illness, and the cause thereof be unknown, an autopsy shall be made by qualified experts."

Under other circumstances necropsy is not recommended. The reason for this stems back to the very nature of the Christian Science belief. In Genesis are found two accounts of man's creation. The first creation was wholly a spiritual one; in the second, man arose from the dust into which God breathed the breath of life. Thus, in the first account man is a true spiritual being; in the second account, accepted by the other religious faiths, man has both a material and a spiritual component. The belief of Christian Science lies in the account of the first creation, in which matter does not exist. Sin, as well as all forms of disease, is considered evil and is nonexistent, according to these concepts. Therefore, necropsy would do no good as it is based on material causes that the Christian Scientists consider as illusions.

Other Protestant Religions

Among the major Protestant Churches one finds a relative unanimity of opinion in the acceptance of necropsy. The Bible in no place mentions necropsy, postmortem examination or the equivalent. Modern church writings usually do not mention necropsy and the attitude of the various churches is that of acceptance. They consider that the indestructibility of the soul militates against any harm that could possibly result from necropsy. One must consider, however, that it is the moral obligation of the physician to perform necropsy in a careful manner, with proper respect exhibited at all times during the procedure. All churches insist on this.

In conclusion, it is apparent that necropsy is usually permitted by most religions in the interest of the advancement of science and for the betterment of mankind. Exceptions to this have been noted.

AMERICAN MEDICAL EDUCATION FOUNDATION

Several large contributions from state medical associations have boosted the American Medical Education Foundation nearer to its goal of two million dollars in 1954. The California Medical Association recently contributed $100,000. Another large contribution came from the Arizona Medical Association in the amount of $7,230, which represents a $10 per member dues increase voted for AMEF by the association. Both Arizona and Utah have followed Illinois physicians by voting a dues increase as a method of increasing contributions from their states.

Since January 1, 1954, the Foundation has received a total of $968,000 and expects to reach the one million mark this fall.

Case Report

SUPERIOR MESENTERIC VEIN THROMBOSIS

MC LEMORE BOUCHELLE, M.D., AND HAROLD H. JOFFE, M.D.
Virginia, Minnesota

The diagnosis of this catastrophic abdominal emergency is difficult and definitive treatment is often delayed too long. Intra-abdominal venous thrombosis produces a bizarre clinical picture and the diagnosis is often missed or erroneously interpreted as its arterial counterpart.[1,14,15]

We wish to report an interesting case of thrombosis of the superior mesenteric vein.

Case Report

This 70-year-old white female was first seen in consultation at a nearby hospital and admitted to this hospital on October 3, 1953, with complaints of nausea, vomiting, and abdominal distress of four days' duration. These symptoms at first were mild in character but on October 2, 1953, the patient vomited everything she ate and experienced an episode of diarrhea with passage of small amounts of gas which was followed by abdominal distention and labored respirations. There was no remarkable abdominal pain but she did complain of pain in the substernal region. There had been a 25-pound weight loss during the past six months with no history of any similar episode or previous abdominal surgery. Further questioning revealed a history of a posterior myocardial infarction in the winter of 1952, a phlebectomy in August, 1953, at another hospital, and a severe penicillin reaction.

The patient was dehydrated with a pulse rate of 70 and respiratory rate of 24 per minute. The temperature was normal. The blood pressure was 140/90 and the heart was enlarged to the left with a normal rhythm, good tones and no murmurs. The chest was clear. The abdomen was distended with audible high pitched but "distant" peristaltic sounds. There was no tenderness or mass. Pelvic and rectal examinations were negative. Stasis dermatitis of the lower extremities was evident, and there was an old phlebectomy scar on the right.

The red blood cell count was 7,090,000 with 16 grams of hemoglobin. The white blood cell count was 13,100 with 85 per cent neutrophiles. The urine gave a three plus reaction for albumin. An EKG was interpreted as showing an old posterior myocardial infarction. A flat plate of the abdomen at the nearby hospital revealed a distention of the stomach and small bowel and no gas in the large bowel. When repeated on admission to this hospital, after gastric decompression with a Miller-Abbott tube had been accomplished, the findings were essentially unchanged. The tube failed to pass through the pylorus. A chest film showed only a left ventricular enlargement of the heart; lung fields were clear.

An exploratory celiotomy was performed on October 3, 1953. Resection of 55 cm. of small bowel and an ileo-ileostomy were carried out because of multiple scattered areas of dark blue-black discoloration. No evidence of any obstruction was found.

The resected specimen showed patchy areas of blue-black discoloration which were easily visible through the serosa and were more marked in the proximal portion. The lumen contained serosanguinous fluid and soft fecal material. There was slight edema of the walls. The mucosa was intact but raised, due to the underlying linear, oval, and wedge-shaped areas of blue-black discoloration. On microscopic examination no inflammatory cell infiltration or ulceration of the mucosa was apparent. The vessels were engorged with red blood cells, associated with mild intravascular neutrophilic infiltration and beginning vascular organization. In the submucosa, muscularis, and serosa there were areas of recent and old hemorrhage with mild perivascular neutrophilic infiltration.

The patient tolerated the surgical procedure rather well. The carbon dioxide combining power on October 4 was 27 volumes per cent (12.2 mEq. per liter). The hematocrit was 44 per cent and the plasma chloride measured as sodium chloride was 440 mg. per cent (75.2 mEq. per liter). Heparin and dicumarol were begun. On October 5 the temperature had risen to 101.8 degrees. There was loose mucus in the tracheo-bronchial tree but the patient was coughing fairly well. The following day there were coarse râles in the chest, abdominal tenderness, and no evident peristalsis. The temperature rose to 105.2 degrees on October 6 and abdominal tenderness increased. The patient's condition deteriorated rapidly and she died that same evening.

The essential necropsy findings, in addition to a recent intact ileo-ileostomy and bronchopneumonia, were: arteriorsclerotic heart disease with cardiac hypertrophy; (a) calcification of mitral ring, grade III, (b) calcific aortic nodular disease with aortic stenosis, grade II, and (c) thrombosis of superior mesenteric vein. The thrombotic process did not involve the portal or lineal vein. There was no demonstrable phlebothrombosis or thrombophlebitis in the veins of the lower extremities. The segment of remaining small bowel was normal. There was no evidence of old or recent myocardial fibrosis or infarction.

Sections from the superior mesenteric vein revealed no sclerosis or inflammatory cell infiltration of its wall. The lumen contained antemortem thrombus material.

Etiology

Venous thrombosis is usually secondary to intra-abdominal infections, neoplasms, surgical procedures, arteriosclerosis, cardiac decompensation, blood dyscrasia, polycythemia vera, trauma, incarcerated hernias, migrating thrombophlebitis, portal stasis, adhesions or bands, volvulus or intussusception. Occasionally it may be primary or of unknown etiology.[1,6,7,11,12,16] An instance has been reported following mumps.[8]

In Johnson and Baggenstoss' review[11] of ninety-nine cases studied in a period of almost thirty-four years, when those whose disease was secondary to strangulation by hernia, volvulus and intussusception were excluded, patients between the ages of forty and sixty-nine accounted for 70 per cent of the cases. Seventy-nine per cent were secondary to either intra-abdominal

From the Department of Pathology, Municipal Hospital, Virginia, Minnesota.

infection, neoplasm or abdominal surgical procedures, and only 8 per cent were primary or of unknown etiology. Berry and Bougas,[1] reported the occurrence of fifty-three cases in 54,000 surgical admissions over a twenty-two-year period. Only eight cases were of unknown etiology, an incidence of primary venous thrombosis of 0.02 per cent of the surgical admissions.

Pathology

The arterial type of thrombosis may be general or segmental and is due either to emboli or thrombi. The venous type is always thrombotic.[7] Since the process is slower, venous occlusion of the mesenteric vessels usually results in hemorrhagic infarction and not gangrene as is seen in the arterial occlusion.[9,14] These hemorrhagic infarcts usually involve the lower part of the jejunum and the ileum[9] but may involve the entire small bowel.[2,3]

Any part of the mesenteric venous system may be occluded. In Johnson and Baggenstoss' series[11] of ninety-nine cases, the superior mesenteric vein or its tributaries were involved in ninety-three or approximately 94 per cent of the cases. Simple thrombosis, both recent and old with organization, was the most common histopathologic process.

The walls of the involved segment are usually thickened, edematous and dark red in color. The lumen contains serosanguinous fluid, and the mucosa may show all stages of degeneration with edema and engorgement of dilated vessels. The other layers reveal a hemorrhagic reaction.[1,9]

Symptoms

The symptoms are those of any other acute abdominal condition with obstruction: pain, vomiting, diarrhea or constipation, abdominal rigidity with tenderness, distention, and borborygmi, fever, melena, shock, leukocytosis, and hemoconcentration.[1,9]

There is often a prodromal period of several days' or weeks' duration characterized by vague abdominal discomfort and occasionally by diffuse intermittent abdominal pain. The onset is usually slow. Mild to moderate colicky pain and tenderness in the lower abdomen on deep palpation are common. The pain is frequently out of proportion to the abdominal findings and is usually not easily controlled by opiates.[1,9] Distention is usually present but tympany is frequently absent because the loops of bowel are filled with blood and fluid. Vomiting occurs in more than one half of the cases and diarrhea or constipation may be prominent features. The latter is more common if the prodromal period is of several days' duration.[1] Hematemesis is a rare sign, but, if present, is very suggestive but not diagnostic. Gross or occult blood in the stool is not frequently seen. With an associated ileus the blood from the small bowel may not reach the large bowel. A clinical picture of shock is rarely seen. The temperature and white blood cell count may be normal or elevated.

Diagnosis

The lack of specific diagnostic findings is probably the reason for the frequent error in diagnosis. Despite the early lack of spasm and rebound tenderness, the condition should be considered an acute abdominal emergency.[9] The differential diagnostic features between arterial and venous thrombosis is that in the latter, the onset is slow with mild to moderate colicky pain, tenderness in the lower abdomen on deep palpation usually without any significant elevated temperature or leukocytosis.[9]

The preoperative diagnosis is frequently that of intestinal obstruction, acute pancreatitis, perforated peptic ulcer, acute cholecystitis and the other acute abdominal conditions. The following criteria may be helpful in making an accurate diagnosis:[9,10,13]

1. A prodromal period of vague abdominal discomfort or severe colicky pain out of proportion to the physical findings.
2. Constipation or diarrhea.
3. Marked abdominal tenderness with little spasm.
4. Normal or slightly elevated temperature.
5. Polycythemia and a high hematocrit.
6. A flat plate of the abdomen showing hoop-shaped, slightly dilated loops of jejunum with serrated margins and/or gas in the proximal half of the colon which stops rather abruptly in the mid transverse colon.

The prognosis is more favorable in thrombosis of the mesenteric arteries[4] and recovery from mesenteric venous thrombosis is rare.[5]

Treatment

The best treatment is early exploratory laporotomy with resection of bowel and mesentery well beyond the site of infarction and primary anastomosis.[13]

The use of anti-coagulants such as heparin and dicumarol are useful adjuncts. Fleming[9] reported a case of mesenteric venous thrombosis which was explored for diagnosis and recovered by use of anti-coagulant therapy alone.

Summary

We have reported a case of thrombosis of the superior mesenteric vein to illustrate that, as compared with arterial mesenteric thrombosis: the onset of venous thrombosis is slower; the abdominal tenderness is out of proportion to the muscular spasm; fever and leukocytosis are usually absent; and, the outcome is much more often fatal.

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(Continued on page 746)

President's Letter

TOO MUCH TROUBLE?

It is always discouraging to me to read the figures showing the percentage of qualified voters who do not go to the polls in this country.

And it is even more discouraging to feel obliged to urge people to vote on election day.

We, as Americans, should not need to be urged to vote. We should do it automatically, that is, we should consider it an unalterable routine to cast our ballots for the candidates of our choice.

Because we are a nation of free people, we often take for granted that very freedom. We find ourselves lax in the responsibilities of citizenship, when we ought to realize that the freedoms we enjoy carry with them the load of responsibility felt strongly by only a few. The right to choose the men who represent us is one of those rights which embodies the traditional principles of a free democratic people.

Voting is a job of the people. It is a task, to be sure, but it is a challenging one—and one we should be proud to undertake. But voting also has a certain satisfaction to it—it can give the same feeling known after a job well done. It makes us part of the general picture, and can make us feel as if we have done something to influence, in some small way, the trend of things nationally, and on a state and local level.

Now that the primaries are over, and candidates have squared off in campaigns we, as physicians and as citizens as well, must take the role of judges. We must weigh qualifications, study platforms, scrutinize past records, and cast our ballots. Whether we vote as just plain citizens, or as practitioners makes no difference—the important thing is to vote, to shoulder seriously the responsibility that is ours.

It is a well-known fact that the medical profession has not voted regularly; the percentage of those physicians who do vote is shamefully low. Minnesota physicians can help shatter that low record by taking a few minutes on November 2 to go to the polls and become part of the working government by exercising the right of free choice.

President, Minnesota State Medical Association

Editorial

ARTHUR H. WELLS, M.D., *Editor;* HENRY G. MOEHRING, M.D., and JOHN F. BRIGGS, M.D.

BUILDING FOR THE FUTURE

AS YOUR state chairman, it was again my privilege this year to attend the A.M.A. committee meeting of the American Medical Educational Foundation, which was held in Chicago January 24. I was impressed with the personal challenge that faces every doctor practicing medicine in this country. Too many times the AMEF is thought of as another organization on a national basis trying to get a donation from the doctor. He may feel that having supported other worthy medical enterprises on a state level that he will let this plea go unheeded. Perhaps he has not taken the necessary time to familiarize himself with the objectives of this fund and how it can affect him directly.

Briefly, the AMEF is attempting to raise funds from individual doctors, on a voluntary basis, in support of our seventy-nine medical schools who are in dire need of unrestricted funds. In 1953 the University of Minnesota received $28,036.00 from the fund. Such funds are urgently needed over and above those our school gets through legislature appropriations. This leaves the school with many financial deficits to cover such items as augmenting professors salaries, special equipment necessary for training students, residents and fellows, and research. There are also scholarships and student loans that must be considered.

We are living in a competitive world. Therefore, if we wish to maintain high standards of teaching and techniques, as well as the advancement of science through research, our medical schools must continue to be adequately financed. This can only be accomplished through private or government sources. Endowments and state funds cover less and less of the needs each year because of the rapidly increasing costs. Even now the government is furnishing certain funds to our medical school. Funds received from this source during the past year have been $25,000 for improved cancer teaching, $25,000 for improved teaching of cardiovascular diseases and $15,000 for improved teaching in psychiatry. These grants however are for specific purposes and on a year to year basis. Money received from AMEF was used for the following important purposes: salary for a medical artist and illustrator for teaching demonstrations and making charts and lantern slides; employing two animal caretakers for animal research projects; augmenting salaries for an instructor in physiological chemistry, and a teaching assistant in physiology, and salaries for two additional internists returned from military service, one to head the outpatient admissions clinic and the other as an instructor in internal medicine. The remainder of the fund will be used to help buy teaching equipment for the new Mayo Memorial building.

As practicing physicians, we are the recipients of the many new and startling advancements that we have been privileged to add to our armamentarium from year to year. Even if every doctor contributed to the best of his ability in support of this cause, we would not as a group succeed alone. However, we are not alone in this endeavor. Industry has also sensed that it has a large stake in medical education. It too is vitally concerned with industrial health and medicine. Support from this large source depends a lot upon the support the medical profession gives this fund. It has been indicated in a definite way that industry feels that the profession can do a better job than it has done.

It might be of interest to you who take the time to read this, that there are 4,288 doctors registered in Minnesota. In 1953 only 222 doctors in Minnesota contributed to AMEF. The breakdown on this reveals that of the four large medical centers, twenty-nine doctors in Hennepin county, six doctors in St. Paul, sixty-five doctors in Duluth, and twenty-one doctors in Rochester contributed $1,540.00, $170.00, $1,690.00 and $975.00 respectively. Of the remainder of the state, 101 doctors contributed $4,073.00 for a total of $8,449.00. A comparison of 1953 to 1952 contributions shows an increase of from .96 per cent to 5.18 per cent. Not very impressive, is it?

Finally permit me to point out that every physician owes something to his medical school. Aside

from the tuition he paid when going through school he has paid nothing for his education. An alternative to the support of the AMEF program would be to cut down on educational standards, or to accept federal support for our medical school. I am sure you will agree that neither the public nor the profession will stand for that. Do you think enough of your profession to back it up with a contribution?

In the near future you will receive information on the American Medical Educational Fund, together with a request for a contribution from you. I sincerely urge every doctor in the state to support this worthy project.

H. E. DRILL, M.D.

MEDICAL EDUCATION ON TAPE: PART II

AN EDITORIAL in MINNESOTA MEDICINE* called attention to the Audio-Digest Foundation of California which is producing tape recordings of reviews of medical literature in various fields, of the proceedings of medical conventions, and of special lectures by renowned authorities. These recordings are then rented or sold to physicians on a non-profit basis.

There is little doubt that the Audio-Digest service can be of real aid to the busy practitioner in keeping up with important advances in medicine. We do, however, wish to take issue with the suggestion made in the editorial that this development will render obsolete and unnecessary the various postgraduate medical education programs available to today's physician. Although audio-visual aids of many types are being used with increasing frequency and effectiveness by educators in many fields, the student-teacher relationship still is—and will continue to be—the basic element in any educational program. This relationship must be close and personal for education is far more than the simple dissemination of factual information. It is a complex reaction for which the experienced, stimulating teacher performs a vital catalytic function. If this were not so, the printing press would long since have solved the problem of education; not only the phonograph but the teacher as well would be unnecessary. Spontaneous discussions and the question-and-answer sessions are essential features of any teaching program. Medical education, like the practice of medicine itself, cannot become an assembly line or "ready-to-wear" proposition.

It is particularly difficult for us to see how the physician could place sole reliance on recorded lectures for extending his knowledge in certain fields of which electrocardiography, endoscopy, radiology, and hematology are a few examples. These and many other fields require well-prepared demonstrations in addition to the opportunity for the student—undergraduate, graduate, or postgraduate—to exchange viewpoints with the instructor.

The editorial also asked the reader to choose whom he would prefer to hear discuss rheumatic heart disease, Paul D. White or Joe Doke of his own city. The answer it naturally evoked was "Why, Paul D. White, of course." The question should, however, have been stated as follows: "Would you prefer hearing Paul D. White on tape recording, or Joe Doke in person, where he will be available after his formal talk for answering questions and discussing particular points of interest?" The question thus stated, particularly if considered in light of the possibility that Joe Doke may himself be a pretty fair cardiologist and a good speaker, might bring about a less unanimous response.

We do not wish to convey the impression that we believe that the Audio-Digest is without value. As stated at the outset, we believe that is a really significant development and one which will be of real help to a great number of physicians. We do not believe, however, that physicians will be willing to use the Audio-Digest service to the exclusion of all other means of continuing their education. We do not believe that it spells doom for postgraduate medical education programs. For many years, excellent records which teach German and other foreign languages have been available, yet students still register for courses in these subjects in our colleges and universities. The availability on records of the lovely music from "South Pacific" with the voices of Ezio Pinza and Mary Martin did not, to our knowledge, make tickets to that production less sought after. If anything, these records interested more people in seeing the play. Perhaps Audio-Digest will in the long run have a comparable effect.

ROBERT B. HOWARD, M.D.

*Medical education on tape. Minnesota Medicine, 37: 213, (March) 1954.

TOO MANY MEETINGS

THERE ARE too many medical meetings. This is especially true in the larger cities. The very purpose for which meetings were primarily instituted is defeated. They teach the profession less and less, and waste more and more of the already deficient time in the average physician's day.

Every hospital besides its general monthly meeting has meetings of various committees, specialties and laboratories. Some hospitals average a meeting a day. Many counties hold a meeting once a month. Besides the state Medical meeting usually held once a year, there are various medical national clubs, societies and organizations devoted to the specialties which also hold meetings monthly, quarterly, semi-annually or annually. Thus a physician placed on two or three hospital staffs and forced to attend the absolutely necessary meetings, to be in good standing both in the hospitals and his medical groups, may not find time for all the meetings.

Since there are so many meetings often the material presented is not clinical but historical in scope and sometimes boring by too-frequent repetitions. Every physician knows very well, that discoveries in medicine worthwhile do not occur daily, weekly or even monthly. The material at such meetings frequently falls below the average expectations. It is only on rare occasions that the physician finds something new and valuable. For want of well-rounded-out speakers at some meetings, as well as interesting topics to be presented, occasionally both speaker and material are also poorly prepared.

To remedy all the above conditions, only a few measures would be necessary. A reduction in the number of meetings would be most helpful. Then fewer speakers would be required and thus a better choice could be selected. The material too could be improved by omitting ancient historical discourses and devoting more time to recent discoveries, methods of treatment, drugs and helpful procedures. Moreover, if some methods could be improvised to expand the ego of many an ambitious physician without creating another medical society, there would not be a constantly growing list of superfluous medical organizations, unnecessary or useless journals and inevitably increasing number of medical meetings. If some of these medical committees, groups, societies or organizations could be eliminated, or amalgamated with others, there would also be a reduction in meetings.

Such measures would tend to lessen the strain on the physician, conserve his time, prolong his life, preserve his health and yet keep him well informed in medicine with some spare time for recreation. The patient too would receive better care for less expense.

J. A. LEPAK, M.D.

We close this month's editorial page with an anonymous poem that should epitomize the feelings of many a Minnesota physician about this time of year:

THE DUCK HUNTER

The poor duck hunter in his blind
Is chilled in front and wet behind,
It's seven hours since he fed,
And twenty since he's been in bed.
It's cost him near a hundred bucks,
To hide here from the silly ducks,
Which presently, ere day dawns dim,
Will rise and hide themselves from him!

SUPERIOR MESENTERIC VEIN THROMBOSIS

(Continued from page 742)

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Public Health

MINNESOTA'S FACILITIES FOR CARE OF THE CHRONICALLY ILL AND THE AGED

The Minnesota Department of Health has a special interest in the aging population because chronic illness occurs most frequently in this group. It is, to a considerable extent, preventable, because of our responsibility for licensing institutions for the care of older people, and because of authority for the administration of the Hill-Burton hospital construction program vested in the State Board of Health. Since the program started in 1946, the health department has aided in the costs of constructing and equipping 43 facilities with the more than $13 million in Hill-Burton funds which has been made available in Minnesota Now the program is being expanded to include nursing homes, rehabilitation facilities, diagnostic or treatment centers, and places a greater emphasis on chronic disease hospitals.

Minnesota has a very urgent problem in planning for the care of its older people. We now have approximately 300,000 people who are sixty-five years of age or older. This represents 9 per cent of our total population. Only ten states have higher percentages of people in this age group. Many aged persons require some period of institutional care, the period varying from a few days to many years. It is estimated that 10 to 20 per cent of the beds in our general hospitals are now occupied by long-term, chronically ill persons. The general hospital is usually not equipped to provide optimum care for such patients, and their presence in large numbers in general hospitals restricts the number of beds available for acute cases.

The solution to this problem involves the provision of additional chronic disease and nursing home beds in connection with general hospitals. Proximity to the general hospital assures ready availability of good medical and nursing care, of diagnostic and treatment facilities, and also obviates the necessity of duplicating many services such as kitchen, laundry, and boiler plant. Chronic disease units need an adequate staff, a fully-equipped physical therapy department, occupational therapy, and other such services that will encourage maximum independence and rehabilitation. Rehabilitation should begin when the patient enters the hospital and should be based on a careful diagnosis and evaluation of the patient's capacities. The greatest problem in relation to this program is the present shortage of well-trained personnel.

St. Louis county has already provided 5.07 beds per thousand of its population and is supplying valuable information on the number of beds needed for the care of the chronically ill and aged. When this figure is applied to the state as a whole, it is found that Minnesota needs a total of 15,121 beds in this category. At present Minnesota has 338 institutions for the chronically ill and aged, with 10,947 beds. Many of these existing beds (5,694 or 52 per cent) are located in non-fire resistive quarters and should be replaced. The actual shortage of 4,174 beds does not reflect the increased growth and aging of our population; the chronically ill, long-term patients now in acute general hospitals; the proportion of patients in state mental hospitals that might be discharged to communities if proper facilities were available; and the number of aged and chronically ill persons now living in hotels, lodging houses, and similar places, who need care.

In co-operation with the Commission on Chronic Illness, the Minnesota Department of Health has joined eight other state health departments in making a thorough survey of long-term patients receiving nursing care in institutions. This survey will give us considerable information as to the characteristics of these patients and the kinds of care they require. It will also indicate the amount of medical and nursing care they receive and the source of payments for care.

The committee on health, chronic illness, and rehabilitation of the Governor's Commission on the Aging is recommending to the 1955 State Legislature that state aid be provided to assist counties and other non-profit groups in constructing and equipping modern, fire-resistive nursing homes. The amount of $500,000 for each year of the biennium will probably be requested to supplement the very nominal appropriation that is anticipated as Minnesota's share under the recent-

ly amended Hill-Burton law. In expending available funds during the next two years, it is proposed to give high priority to those nursing homes that are closely affiliated with general hospitals to assure adequate medical and nursing supervision as well as good programs of rehabilitation. This is not a new departure for Minnesota, since in 1913 the State Legislature appropriated funds to assist in the construction of county tuberculosis sanatoria. We have an even greater problem today with our aging population. The funds proposed above will not build many beds at present construction costs, but at least a start will be made toward the provision of good facilities at the local level.

HELEN L. KNUDSEN, M.D.
Chief, Section of Hospital Services
Minnesota Department of Health

SCHOOL OF PUBLIC HEALTH IN NEW QUARTERS

When the University of Minnesota's school of public health moves to its new quarters in the newly-completed Mayo Memorial building this fall, it will also have embarked upon its second decade as an organized professional school for training medical and technical personnel in the several fields of public health and preventive medicine.

Organizationally the youngest of the schools in the University's college of medical sciences and one of ten such schools in the United States, it has already won an international reputation as a training center for public health practitioners, educators and administrators.

Students from nearly every state and territory of the United States and from the far corners of Asia, Africa, Europe and South America have flocked to Minnesota to participate in its program; and an average year's enrollment boasts representatives from thirty states and fifteen foreign countries.

The principal work of the school of public health is the training of professional specialists in the major phases of public health work, but its distinguished faculty, under the directorship of Dr. Gaylord Anderson, has also contributed significantly to the study and solution of problems of contagious disease, nutrition, metabolism, physiology, psychosomatics and many another medical question.

Members of the faculty too have found time to bring the message of public health to civic and professional groups in countless speaking engagements, to sponsor and participate in frequent health and medical conferences, and not the least to keep the people of Minnesota informed of modern health and safety practices through radio and television appearances.

Most widely known of these services are Dr. Stewart C. Thomson's weekly radio talks over the Minnesota School of the Air. Housewives, heeding his warnings of dangers in the home, have cajoled their husbands into repairing faulty household equipment.

To these gentlemen, public health work is more than a mere occupation; rather they count themselves as modern bearers of a Minnesota tradition which long antedates the foundation of their school. For well over a half century they and their predecessors have been in the forefront of a dedicated crusade among the state's medical and lay leaders to achieve a strong and progressive program of public health. In large measure too, this crusade and the movement which culminated in the foundation of the school of public health in 1944 goes back to the last quarter of the nineteenth century.

Public Health History

In those years the technique, even the concept, of large scale public health programs was novel. Medicine itself was just beginning to enter upon a new age of discovery and advancement, but disease was still able to spread almost unchecked. Every year 5,000 Minnesotans perished from the ravages of typhoid fever. Influenza, diphtheria, scarlet fever and tuberculosis killed and maimed additional thousands.

Such everyday modern health measures as control over sewage and waste was completely inadequate; and the idea of public filtration and control over water supplies was too revolutionary to win much public support. Even the city of Minneapolis did not begin to filter its water until 1908 and to chlorinate it until 1910.

The beginnings of the long fight for better public health services in Minnesota go back to the indefatigable Dr. Charles Hewitt of Red Wing—a man whose own life personified the

inseparable union between public health training, general medical education and a publicly-supported, statewide public health program.

In his own personal war against disease, the good doctor took to manufacturing and distributing his own smallpox vaccine. And for many years, he taught courses in public health to University of Minnesota students without pay, leaving his private practice in Red Wing at regular intervals to perform what he considered to be a public duty.

It was Dr. Hewitt who first brought before the state legislature the project for creating a state health service and who was responsible in 1872 for Minnesota becoming one of the first three states in the nation to establish a state board of health. It was he also who drafted and presented to the University's board of regents in 1882 the plan for the creation of a medical department at Minnesota.

After the initial victories of Dr. Hewitt and his supporters, public health education and preventive medicine followed two major lines of development in the state. The state board working through the medical profession and through public and private health agencies, sought to encourage citizens and communities to adopt better health and sanitation procedures. And within the medical school, training in public health and preventive medicine became an integral part of every course of instruction.

This was the beginning. In later years as the scope of the medical sciences expanded and the demand grew for greater specialization in the medical profession, the idea of specialized instruction in public health began to take hold. It received further impetus both from the surge of medical research at the beginning of the present century and from the affiliation in 1915 of the medical school with the Mayo Foundation in Rochester.

But the crucial fact was the tremendous need for more effective and more widespread medical service for all the people of Minnesota. In 1915, it was still the destiny of one Minnesota mother in every fifty to perish in the throes of childbirth; and almost one baby in ten did not survive the first year of life. Contagion, despite conspicuous progress in the fight against smallpox, typhoid fever and other diseases, continued to take a heavy toll among children and young adults.

Organization Expands

Such was the backdrop for the next surge in the development of public health training in Minnesota. In 1918, the medical school, supported by a special legislative grant, began to offer a special three-month course in public health nursing. Four years later, this course, one of the first of its kind to be established in the United States, was expanded to nine months.

During that same year, the increasing demand for specialized health education and for trained leaders in public health led to the creation in the medical school of a separate department of preventive medicine and public health. One of the original instructors was Dr. Harold S. Diehl who was to become dean of the college of medical sciences in 1935.

The ensuing decade saw the gradual addition of new functions to the training and research program of the new department. In the mid 1930's the United States Public Health Service chose Minnesota as one of its centers for public health training; and in 1937, Dr. Anderson, who already had made a distinguished career of public health work in Massachusetts, came from Harvard to head the department.

The year 1944 witnessed the reorganization of the department as the school of public health; and the postwar period saw the addition of professional training courses in hospital administration, public health engineering, vital statistics, public health education and public health veterinary medicine. In 1946 also, Dr. Ancel Key's famous laboratory for physiological hygiene, which had been organized in 1937, was made a division of the school.

School Outgrows Facilities

With this multiplication of teaching activities and the accretion of other new responsibilities, the school had outgrown its facilities in Millard Hall and found itself compelled to resort to makeshift arrangements to carry on its work. The ultimate solution was found in the allotment of space in the newly constructed Mayo Memorial building; and when the school takes up its new quarters on the eleventh and twelfth floors of the building, it will bring together units which previously were scattered through five widely separated buildings.

As it is presently organized, the school of pub-

(Continued on page 752)

Medical Economics

Edited by the Committee on Medical Economics
of the
Minnesota State Medical Association
George Earl, M.D., Chairman

PR INSTITUTE WELL ATTENDED

The AMA Public Relations Institute, held in Chicago, September 1 and 2, had a record number of 250 registrants from all states. The meeting covered various aspects of public relations, from national, state and county medical organization levels, including such subjects as how direct mail should be handled, a television production seminar, public relations and the medical assistant, working with the allied professional fields, and the over-all fee situation.

One of the more interesting sessions of the meeting was entitled "What's the Score on Fees?" It included panelists Joseph Donovan, San Jose, executive secretary of the Santa Clara County (California) Medical Society; Dr. Walter L. Portteus, Franklin, president-elect, Indiana State Medical Society; and, Boyden Roseberry, White Plains, executive secretary, County of Westchester (New York) Medical Society.

Prior Agreement Necessary

Mr. Donovan described the "usual" fee plan of his county medical society, which was based on a survey of average and median fees of county physicians, which was tabulated to provide what he called an index of "usual" fees in the county. The county society has adopted this fee index, he said, but with the stipulation that the doctor has the freedom to charge more or less than the index *as long as there is prior agreement with the patient.*

Dr. Portteus stated that medical fees are one of the most intimate problems to the patient and his family. He stated that prior discussion of fees with the patient can obviate much of the misunderstanding and pave the way to payment. It also tends to eliminate cases of over-charging, he said. He distributed a pamphlet which he has prepared and gives to all his patients who are to be hospitalized. The pamphlet gives the patient a concise preview of what he should expect in medical care and hospital service, the medical team which will care for him, and the type of bill he will receive. It puts on paper what many doctors only discuss with their patients, and has an excellent public relations value for the doctor and his patient.

Mr. Roseberry discussed the medical social worker and the physicians' fees. He described his county society's program of using a medical social worker in conjunction with its Bureau of Medical Economics and its Mediation committee. The Bureau handles cases of inability to pay, dissatisfaction with care, dissatisfaction with fees. All these cases are referred to the medical social worker for investigation and report.

The Mediation committee handles all complaints that come to the society, through the social worker, but about 90 per cent are settled before referral to the committee, Mr. Roseberry reported. He stressed the value of the medical social worker in hearing the patient's complaints, stating that they do not, therefore, require that the complaint be put in writing. Any committee decisions adverse to the patient are handled by the social worker, who sees the patient and can explain personally why the decision was so made. The patient can then ask questions, and feels that he has had a better chance to have a complete hearing of his complaint.

BOARD SUGGESTS ORDINANCE TO PREVENT NURSING HOME FIRES

The National Board of Fire Underwriters announced recently a new edition of its "Suggested Ordinance on Nursing, Convalescent and Old Age Homes." The ordinance regulates safety measures for such homes, and is designed for adoption by municipalities and may also be used as a basis for state or county regulations.

Notes Lives Lost

Within the last ten years four of the more tragic fires in nursing and old age homes took the lives of eighty-eight persons, a bulletin from the Board states. "The record shows that the loss of life in those and many other fires in similar homes resulted from several causes, the most important of which were the use of highly combustible fibreboard on interior walls and ceilings, unenclosed stairs and dumbwaiters, lack of sufficient exits, inadequate fire separation for parts of buildings containing special fire hazards, and lack of automatic sprinkler protection."

Sounds Warning

The Board states that some nursing, convalescent and old age homes have modern buildings of fire-resistive construction, but a great many existing homes are in buildings of combustible construction. Many of them are in buildings originally built for use as private dwellings. The Board points out:

"Large wooden frame dwellings of two or three stories in height provide reasonable fire safety when occupied by a single family, but when used for housing as many persons as can readily be contained in them when converted to nursing, convalescent or old age home occupancy, the hazard to life from fire is greatly increased. This is because of the larger number of persons subject at any one time to danger from any fire that occurs, and because the occupants of these homes frequently are not able to get out as readily as the members of a single family, and because the chances of fire increase as the number of occupants increases in any given space."

SOCIAL SECURITY PASSAGE CALLED "SEVERE SETBACK"

The Association of American Physicians and Surgeons has recently termed the passage of the Social Security expansion bill a severe setback for American liberty.

Because Section 106 was included in this bill, the Association feels that it is "unquestionably the biggest single step towards socialized medicine ever accomplished by any Administration." The Association's bulletin states: "The innocent sounding clause, 'to protect the benefit rights of disabled workers,' provides for doctors to certify permanently and totally disabled workers subject to rules and regulations of the Secretary of HEW (presently Mrs. Hobby) and to be paid out of the Social Security 'trust fund.' In other words, physicians who participate in this nefarious scheme to capture the American medical profession, will be government contract doctors—or participating slaves in socialized medicine as far as medical certification is concerned."

Asks Repeal of Section 106

Inclusion of Section 106, compared to exclusion of physicians under the law, is a small victory, the Association declares. Its bulletin states:

"The small victory is the exclusion of physicians from compulsory Social Security. However, Washington reporters believe that the present Administration will 'get physicians' next year because President Eisenhower and Mrs. Hobby believe that they should have the 'protection of Social Security for their old age.'"

In urging physicians to work for repeal of Section 106, the AAPS states: "This open door to socialized medicine must be closed before the power-hungry and greedy bureaucrats within the Department of HEW are able to start the enslavement of physicians as government contract practitioners. . . When our lawmakers understand the full import of Section 106—its treachery, its definite long step to socialized medicine—they will rescind this horrible piece of legislation, because most of them are not in favor of imposing inferior medical care on the American people by way of socialized medicine. However, it is up to physicians and their friends to help the lawmakers to understand."

In conclusion, the Association says:

"In the meantime, we recommend that physicians scorn the provisions of Section 106, continue to care for their own patients, refuse to participate or accept any federal pay in the same manner as many doctors did when EMIC was in effect during World War II."

REPORT DESCRIBES HEALTH BEHIND IRON CURTAIN

Communist boasts of good health and medical care are almost entirely untrue and hide the core of the problem—the "human aspect of medicine," a study by the Free Europe Committee, Inc., shows.

Walter H. Nelson, New York, director of magazine information for the American Heritage Foundation, reported on physicians behind the Iron Curtain in a recent issue of the *Journal of*

the American Medical Association . His report is based on findings of the Free Europe Committee.

According to the report, the Iron Curtain doctor is a "new Soviet man" first, and a physician last. He must consider his worker-patients as "economic factors," precious only so far as their health advances the world-wide Soviet power policy. Nelson said:

"Under Soviet-sphere state capitalism, plant physicians predetermine the number of persons entitled to be sick. Physicians are afraid to grant sick leave to too many persons, for this would tend to show that they are not taking sufficient care of the workers' health. Yet poor diet, constant nervous tension, and excessively high work norms make adequate care difficult."

Official Private Practice

Nelson reports that while physicians are officially allowed to practice privately, few do because of the required "exhausting" day's work at state institutions, because of exorbitant taxes on private income, and because few persons can afford private consultation. He notes that private practice probably is allowed only because "Communist bosses hesitate to patronize the state institutions, the conditions of which they know only too well."

Politics Interferes

Medical students are accepted by class origin and political reliability, the report says, and must pass not only medical courses but tests on politics and military principles. They are not allowed to choose their specialties—the Five-Year Plan determines what kind of physicians are needed and where, and a committee annually selects students for each field.

Nelson reports that medical science also has suffered by the outlawing of certain Western scientific principles. If a doctor gets good results with a "forbidden" treatment, he must credit some other cause, or pretend the treatment was just introduced, "with a gigantic 'Made in Russia' tag attached."

PUBLIC HEALTH

(Continued from page 749)

lic health offers professional instruction in seven fields of public health as well as numerous courses for non-professional and medical and nursing students. Behind this stands a broadly based program of research and public service, dedicated to the end of better and more widespread medical services for all the people of Minnesota and the nation.

In the larger sense, the years of growth which have seen public health education come of age in Minnesota have been years of great progress in medicine's long struggle against the hazards of accident and disease. Today less than one mother in 500 dies in child birth and communicable disease has ceased to be a dread menace to the young. More and more the problem of public health has become the problem of combatting accident, communicable disease and chronic infection among the middle aged—the men and women forty-five years and older—who today account for more than 80 per cent of the premature deaths in Minnesota.

That public health education should contribute equally and in full co-operation with the medical profession and the state public health service in the effort to solve this and other present-day problems of medicine, is the objective and the reason for the existence of the school of public health. These goals are in keeping with the aims of the new Mayo Memorial building which itself is dedicated to the provision of better medical services for all people through training, research and service in medicine.

MINNESOTA STATE BOARD OF MEDICAL EXAMINERS

230 Lowry Medical Arts Building
Saint Paul 2, Minnesota
F. H. Magney, M.D., Secretary

LICENSE OF HARRY C. BROWNE, JR., M.D., SUSPENDED FOR THREE YEARS

On July 16, 1954, the Minnesota State Board of Medical Examiners suspended for a period of three years the medical license held by Harry C. Browne, Jr., M.D., because of his personal use of liquor and the various barbital compounds. Dr. Browne had previously appeared before the Board for similar misconduct at which time he was permitted to retain his medical license by entering into a stipulation with the Board in which he agreed to restrain from the personal use of liquor, narcotics and barbiturates. However, when it was learned that Dr. Browne had violated the terms of his agreement with the Board his license was suspended.

Dr. Browne was born in Portland, Oregon, in 1910 and received an M. D. degree from the University of Oregon in 1935. He then served a one-year internship at University Hospitals in St. Louis, Mo. In 1937 Dr. Browne was licensed to practice medicine in Minnesota. At the time his license was suspended Dr. Browne was not in the private practice of medicine but was doing institutional work.

MINNEAPOLIS WAITRESS GIVEN FOUR-YEAR PROBATION TERM FOR ABORTION

Re: State of Minnesota vs. Lucille M. Burke.

On September 13, 1954, Lucille M. Burke, 1335 La Salle Avenue, Minneapolis, Minnesota, a thirty-three-year-old divorcee, was sentenced by the Hon. Thomas Tallakson, Judge of the District Court of Hennepin County, to a term of not to exceed four years in the State Reformatory for Women at Shakopee, Minnesota, on an abortion charge. The sentence was stayed however, and the defendant was placed on probation for a period of four years. On August 7, 1954, Mrs. Burke, a waitress at a Minneapolis night club, had entered a plea of guilty before Judge Tallakson to an information charging her with the crime of abortion.

The defendant, who has had no medical training and who holds no license to practice any form of healing, was arrested by a Minneapolis Police Officer at 2:30 A.M. on August 3, 1954, after she returned to a restaurant to claim a package containing her abortion instruments which she had left there by mistake a short time previously. Earlier that evening, Mrs. Burke had performed an abortion by using a catheter, upon a Minneapolis woman who is married and has a family. Only $90 of the agreed price of $150 for the abortion was paid to the defendant at that time, however, and the balance was to be paid within two weeks. The woman upon whom the abortion was performed did not become ill but was taken to General Hospital by police as a precautionary measure. According to the records, the defendant does not have a prior conviction for abortion.

"YOGI" HEALER SENTENCED TO JAIL FOR VIOLATION OF BASIC SCIENCE LAW

Re: State of Minnesota vs. Shelly Trimmer.

On September 7, 1954, Shelly Trimmer, thirty-six years of age, who lives on Woman Lake Road near Hackensack, Minnesota, entered a plea of guilty in the District Court of Cass County at Walker, Minnesota, to an information charging him with practicing healing without having a certificate of registration in the basic sciences. Following a statement of facts to the Court, Trimmer was sentenced to a term of one year in the Cass County Jail, by the Hon. Arnold C. Forbes, Judge of the District Court. Judge Forbes suspended the balance of the sentence after the defendant has served 30 days in jail, on condition that Trimmer refrains from violating the law and complies with the rules and regulations prescribed in connection with his probation. Trimmer must come back into court in the spring of 1956 at which time it will be determined whether or not his behavior in the meantime justifies a permanent suspension of the sentence.

A criminal complaint against Trimmer was signed by a representative of the Minnesota State Board of Medical Examiners after an investigation disclosed that on August 7, 1954, he had treated a four and one-half month-old baby and that the baby had died on the following day. Trimmer, who admitted in court that he is not registered in the basic sciences or licensed to practice any form of healing, furnished a green liquid medication and some pills for the infant but an analysis of these failed to show that they contained any harmful substances and when a postmortem examination of the baby was done it was found that the cause of death was interstitial pneumonia. Trimmer made a charge of $3.00 for his services in caring for the child.

In response to questioning by the Court prior to being sentenced, Trimmer said he was born in Erie, Pennsylvania, on October 27, 1917, and that he studied Yogi philosophy and healing for one year under Paramhansa Yogananda in Encinitas, California. When questioned concerning his method of healing, Trimmer stated that he determined through "psychic impressions," which he received in this case by running his fingers over the infant's spine, that the nerves from the brain to the rest of the body were not responding properly. Although Trimmer's attorney made a plea to the Court not to sentence Trimmer to jail on the grounds he was a spiritual healer, Judge Forbes told Trimmer that "if he had confined himself to spiritual means he would not have violated the law but people who defy laws must expect the punishment to be severe when it deals with the lives of babies."

History of Medicine In Minnesota

THE PIONEER DOCTORS OF CHIPPEWA COUNTY TO THE YEAR 1900

LEON G. SMITH, M.D.
Montevideo, Minnesota

CHIPPEWA COUNTY may well claim the distinction of being the residence of the first civilian Doctor of Medicine to practice in the state of Minnesota, namely, the **Rev. Thomas Smith Williamson, M.D.**

There were army surgeons located in the state before him, the first one probably being Surgeon Edward Purcell. The first army post was called Camp Coldwater, established at the site of what is now Mendota, in 1819. The following year, the construction of Fort Snelling was begun.

There are records of a devastating scourge of scurvy at Camp Coldwater that first winter of 1819-1820, during which almost half of the command perished. Mention is made of Dr. Purcell sending to the St. Croix River for a quantity of spruce twigs in order to prepare an infusion to combat the scurvy. Dr. Purcell is listed as serving at Camp Coldwater, Fort St. Anthony and Fort Snelling through 1823; his death is recorded in 1825.

The name of another doctor appears in 1832, when **Dr. Douglas Houghton** accompanied Henry A. Schoolcraft's expedition to explore the headwaters of the Mississippi River. Dr. Houghton acted as physician for the exploring force, but his most important task was to vaccinate the Indians against smallpox. His salary was reported to have been $3.00 per day.

The first exploration of western Minnesota appears to have been in 1823. At that time an expedition, under Major Stephen H. Long, proceeded by canoe (as all such expeditions at that time preferably traveled by water) up the Minnesota River as far as historic Traverse des Sioux. This was the ancient fording place of the river on the old trail between the upper and the lower Sioux villages, not far from the site of what is now St. Peter. Due to low water and a frequently obstructed river channel, the canoes were abandoned here, and the journey continued by land along the south bank of the river. Joseph Renville, about whom we shall learn more later, acted as guide and interpreter of this expedition, which continued up the river past Big Stone Lake, where it crossed to the east bank and continued north, down Lake Traverse and the Red River of the North as far as Pembina.

In the account of the expedition, no mention is made that any part of what is now Chippewa County was visited, but with the Minnesota River no wider a stream than it is at this point, with the water level as low as described, undoubtedly some members of the party crossed the river. Thus, 1823 probably is the date that Chippewa County was first visited by white men.

According to Folwell's "History of Minnesota," the Sioux (or Dakotah) nation was made up of seven tribes, three of which, the Teton, Yankton, and Yanktonai, lived upon the great plains to the west of Minnesota. The other four tribes had their homes in Minnesota, and were nicknamed by their western relatives "Isanti" (Knifemen). They, in turn, were made up of the Lower Sioux and the Upper

The History Section will appear in quarterly installments from now on.

Sioux, so named from their geographical location. The Lower Sioux consisted of the Mdewakanton tribe, situated around Fort Snelling and down the Mississippi River as far as Winona, and the Wahpekute tribe, centered near what is now Faribault. The Upper Sioux consisted of the Wahpeton and Sisseton tribes, and it was these two tribes who occupied western Minnesota along the Minnesota River. Occasional bands of marauding Chippewas made their way down the Chippewa and Pomme de Terre Rivers from their wooded domain to the north, but in the main this was Sioux country.

On May 16, 1835, a band of missionaries, consisting of five adults and three children, arrived at Fort Snelling under the leadership of the Rev. Thomas S. Williamson. Dr. Williamson, at the time thirty-five-years-of-age, was born in Union County, South Carolina, March 8, 1800. He was a graduate of Jefferson College in Pennsylvania and of Yale Medical School. His wife, Margaret Poage, was born September 10, 1803, in Mason County, Kentucky. They were married at Ripley, Ohio, April 10, 1827, where Dr. Williamson had located, and where he had practiced medicine for ten years. To this marriage, three children, William Blair, Mary Poage and James G., were born.

Dr. Williamson's father was a Presbyterian minister and had tried to induce his son to become a medical missionary, but Dr. Williamson and his wife saw no reason for leaving the comfort of a settled home and community to face the rigors of the wilderness. In a short space of time, however, all three children died of malaria, and influenced by this, Dr. and Mrs. Williamson decided that "God had work for them to do elsewhere."

Accordingly, he returned to school, spent a year at a theological seminary and received his credentials as a medical missionary from the American Board of Missions. During this time, another child, Elizabeth Poage Williamson, was born. He then organized his mission party consisting of himself, his wife and child; his wife's sister, Sarah Poage; and an agricultural expert and teacher, Alexander Huggins, with his wife and two children. This party arrived, as before stated, at Fort Snelling, May 16, 1835.

It had been Dr. Williamson's plan to settle near Lake Calhoun, where the Pond brothers, Samuel and Gideon, had established a mission a year or two earlier. But, it so happened that, at just that time, Joseph Renville arrived at Mendota to sell his year's take of furs and buy his annual supplies of flour, salt, sugar, and coffee.

Renville was a person of great importance in western Minnesota, and he left the imprint of his personality upon much of the early history of the region.

He was a half-breed, the son of a French trader and a woman of the Kaposia band of Sioux. He had been educated in a convent school in Canada; had held a captaincy in the British army in the War of 1812; had served as an interpreter and *coureur de bois* for the North West Fur Company; had later transferred into the employ of John Jacob Astor's American Fur Company; and, finally, had established a trading post in the Wahpeton Sioux country, upon the northeast side of the Minnesota River, shortly below its exit from Lac qui Parle. Here he built a stockade and group of buildings called Fort Renville (in the fur company's records, Fort Adams) and in it he lived like an old-time baron, maintaining a small army of voyageurs and Indian and half-breed relatives. He taught them to plant and to keep corn, and to accumulate horses, cattle and sheep. He was extremely hospitable and, to the end of his life, among the western Minnesota Indians and breeds, his word was law.

Lawrence Taliaferro, the Indian agent at Mendota, had been having considerable

trouble trying to keep peace between the Chippewas and Sioux. Thinking it might be a good idea to have a sub-agent in the Lac qui Parle area, he invited Renville to dinner, and suggested that he, Renville, might do well to invite Dr. Williamson and his party to locate near him. Since Renville readily perceived the advantages to him and his people of having close to him a combination of missionary, doctor and teacher, in the person of Dr. Williamson, and an agricultural adviser and teacher, as was Mr. Huggins, he readily agreed. He, in turn, quickly induced Dr. Williamson to change his mind about staying at Lake Calhoun. Instead, he and his group joined Renville's party to return to Lac qui Parle.

They left Fort Snelling June 23, in the fur company's large Mackinaw boats, well laden with trader's supplies. There was a good stage of water, and fair time was made by using oars, poles, even at times sails, and by pulling on willows along the banks. At Traverse des Sioux, they were met by wagons and Red River carts with oxen from Fort Renville, and the rest of the trip was made by land, leaving the Minnesota River near the mouth of Hawk Creek and cutting across overland by Black Oak Lake (four miles east of the present Montevideo), fording the Chippewa River near the present site of Watson, and reaching Fort Renville July 9, 1835, seventeen days' journey from Fort Snelling.

This date is important to this chronicle, as it marks the time of location of the first resident, civilian doctor in Chippewa County, and probably in the State of Minnesota as well.

Our history of Dr. Williamson in his new location, naturally is much more detailed regarding the missionary than the medical side of his activities, but there is no doubt that, in the succeeding years, he completely fulfilled Renville's hopes for success for him in his multiple role of preacher, teacher and doctor of the Indian people.

Dr. Folwell, in his "History of Minnesota," says:

> "Dr. Williamson was a man of intense but simple piety, possessed of strong common sense and indefatigable industry, absolutely devoted to the Indian life."

He was the first missionary to the Sioux people. In the short time he had been at Lake Calhoun, he had organized the first Christian church in Minnesota, June 12, 1835. It was named the "First Presbyterian Church of St. Peters" and its membership of twenty-two was made up mostly from the garrison at Fort Snelling.

Very soon after reaching Lac qui Parle, he organized a Presbyterian church there, with three members, which was shortly joined by Renville's wife and others of her family. Mrs. Renville was the first of pure Sioux blood to profess and die a Christian. Later, Renville himself, though raised and educated as a Roman Catholic, joined the church and became a ruling elder.

As Dr. Williamson was unable to speak the Dakotah language, he recognized the value of one who could; he, therefore, persuaded Gideon Pond, who could speak it, to leave Lake Calhoun and join him at Lac qui Parle.

The spring following Williamson's arrival, in 1836, work was started on building a large log mission close to Renville's stockade. It was within sight and hearing of Lac qui Parle, so named by the early French voyageurs as the "Lake that Talks." It is said that, when the wind is from the right quarter, the waves, breaking upon the stones, result in a distinct, musical note, thus giving the lake its melodious name.

Also, under Mr. Huggins' direction, the squaws developed and cultivated cornfields across the river along the flat, rich river bottoms.

The mission was about 200 miles from Fort Snelling. Mail came at intervals of three to five months, though at not such prohibitive postal rates as one would suppose, the rate being only 25 cents per letter. More urgent messages were dispatched by Indian runners. Once a year, at least one of the missionaries would go down to the Fort, accompanying Renville's party for supplies.

Three months after the Williamson's arrival at Lac qui Parle, another child, John Poage Williamson was born, October 27, 1835, the event occurring in a dirt floor cabin, in Renville's stockade. John undoubtedly was the first white child to be born in Chippewa County or, for that matter, in western Minnesota.

The Indian name for Dr. Williamson was Payjehoata Wechasta, meaning medicine man or, literally, grass-root man, namely doctor.

Following the completion of the mission, Dr. Williamson started the most important work of his life, the translation of a large part of the Scriptures into the Sioux language.

Again quoting Dr. Folwell:

"In Renville and Gideon Pond, he found efficient guides and helpers. The work was carried on in the living room of Fort Renville, with members of the bodyguard seated on the surrounding benches, smoking their pipes. Williamson read the French version from the great family Bible of his host. Renville, accustomed to rapid interpretation, promptly dictated the Dakotah translation to Gideon Pond, who acted as scribe."

The following year, in September, 1837, a young minister, Stephen R. Riggs, joined the Williamson band, and from here on, most of our information comes from his writings, particularly his "Forty Years with the Sioux" and "Mary and I."

Joseph Renville died in 1846, and with his strong influence removed, there was much "backsliding" of the Indian converts. Shortly thereafter, Dr. Williamson was invited to move to the village of Little Crow at Kaposia, near the present site of South Saint Paul. This was probably due to the fact that the Lac qui Parle Indians had many relatives at Kaposia, so that the reports of his good work among them had reached Little Crow.

By this time, the Williamsons had several more children. They had probably recognized the disadvantages of living longer among the Wahpeton Sioux, who had been getting out of control since Renville's death, as well as the advantages of moving the family to a more civilized environment.

They moved to Kaposia, where he conducted a mission for several years; transferred back to the Minnesota Valley at a station near the Yellow Medicine Agency; remained there until after the Sioux Outbreak of 1862, after which, most of the Sioux were moved out of Minnesota. He and his wife then moved to St. Peter where they lived the rest of their lives, except for extensive traveling. Mrs. Williamson died July 21, 1872, and Dr. Williamson several years later, June 24, 1879. He continued work upon the translation of the Bible up to the last, even after he was confined to bed. Their home is still standing in St. Peter, or, at least it was in 1935. Both are buried in the old Traverse des Sioux cemetery, a few miles from St. Peter.

Hearing that a great-grandson of Dr. Williamson's is teaching music in Canby, Minnesota, I communicated with him and he graciously furnished me with the later history of the Williamson family, subsequent to its leaving Lac qui Parle.

There were seven children, in addition to the three who died as infants in Ripley, Ohio:

Elizabeth Poage, the child who accompanied her parents from Ohio, was married to Andrew Hunter in 1858 and died in St. Peter, March 11, 1863.

John Poage, the first child born in Chippewa County, was the grandfather of my informant. He became a missionary to the Sioux Indians and was stationed at the Redwood Agency at the time of the outbreak. Fortunately, he was visiting in Ohio at the time. Later he went with the Minnesota Sioux when they moved to the Fort Thompson Reservation in South Dakota. He continued to work as a missionary at the Yankton Reservation near Greenwood, South Dakota, where his son Gary and his grandson, Andrew, were born and where he died, October 9, 1917, after fifty years of missionary work with the Indians.

Andrew W. was born January 31, 1838, at Lac qui Parle. He became professor of mathematics at Gustavus Adolphus College in St. Peter and Augustana College in Rock Island, Illinois. He never married. He died in Portland, Oregon.

Nancy Jane was born at Lac qui Parle, July 28, 1840, and died at Greenwood, South Dakota, November 27, 1877.

Smith Burgess, born September 21, 1847, at Lac qui Parle, was dragged to death by an ox team at Yellow Medicine Agency, March 11, 1856, at the age of nine.

Martha, born October 5, 1844, at Lac qui Parle, died at Gresham, Oregon.

Henry Martin, born March 1, 1851, at Kaposia, Minnesota, died at Portland, Oregon.

After Joseph Renville's death, his trading post was taken over by Martin McLeod, a Scotchman who married a Sioux woman. He appears to have been a capable man, and in later years was elected to the state legislature and was prominent enough to have had a Minnesota county named for him.

The old mission at Lac qui Parle, after Williamson's departure, was conducted for at least part of the time by Stephen Riggs, but he was away working in other fields much of the time. In 1854, when the mission burned, the remaining badly depleted personnel was transferred to Dr. Williamson's station which was then at the Yellow Medicine Agency.

Several years ago, a replica of the mission was built upon its original site on the banks of the Minnesota River, about four miles west of Watson, where it was formally dedicated July 12, 1942.

There was, for all practical purposes, no government in Minnesota prior to 1836. At that time the Wisconsin Territory was organized, which included that part of Minnesota lying east of the Mississippi River. West of the river, whatever government existed was that administered by the Indian tribes, the Chippewas controlling that portion of the state lying in the wooded areas of the north and east, and the Sioux in charge of the prairies of the southwestern part.

In May, 1848, the Honorable John Catlin, as acting governor of Wisconsin Territory, called a special election in that part of the territory north and west of the St. Croix and Mississippi Rivers, and the Honorable H. H. Sibley was elected as delegate to the Congress of the United States to represent that area.

On March 3, 1849, the Territory of Minnesota was organized, in much its present form, with Saint Paul as the capital and the Honorable Alexander Ramsey as first territorial governor.

In 1851, three treaties were made with the Sioux and Chippewas, whereby large tracts of land were relinquished to the United States. The Treaty of Traverse des Sioux, with the Sisseton and Wahpeton tribes, July 18, 1851, acquired the land from Lake Traverse east to the Mississippi, except for a reservation extending ten miles from the Minnesota River upon either side, and running one hundred miles

along its upper length. It was in this area that present Chippewa County lay. When first organized, it was split off from Renville County and included Swift County, and did not attain its present size until 1870, when Swift County was detached by act of the legislature. This action was ratified by the inhabitants of both counties at the next general election.

At the time the earliest settlers began to arrive, this was, of course, virgin country and a hunter's paradise: the habitat of buffalo, deer and elk; of fox, prairie wolf and occasional timber wolf; of badger, beaver, muskrat, mink and raccoon; of quail and prairie chicken; of plover, kill-deer and meadow-lark; and, of innumerable varieties of migratory water birds, snipe, duck, goose, swan and sand-hill crane. Many of these are still with us, but the buffalo, elk, timber wolf, prairie chicken, and sand-hill crane are seen no more in western Minnesota, and the prairie wolf, beaver, badger, quail and plover are rare.

In prehistoric times, it is thought that a tremendous body of water, Lake Agassiz, covered the entire Red River Valley region, and instead of draining north, as now, it drained to the south and east through the River Warren, and it was the erosion by this stream that formed the broad valley of the present Minnesota River. Roughly limiting this basin are two great terminal moraines, left by the glaciers of the Ice Age. Upon the southwest side is the line of hills running for many miles in a southeasterly direction from South Dakota into Minnesota near the Lac qui Parle-Yellow Medicine County line, well known to the early voyageurs as the "Coteau des Prairies." Forming the northeast side of the watershed is a similar conformation called the "Leaf Hills," running across Swift and Pope Counties, and the affluent streams that feed the upper Minnesota all rise in these hills.

Chippewa County lies wholly within the Minnesota basin. The shape of the county is roughly a triangle, with the hypotenuse its southwest border, lying along Lac qui Parle and the Minnesota River. The river's largest affluent stream from the north during its entire length is the Chippewa River, which bisects the county, and with its tributaries of Shakopee Creek and Dry Weather Creek, drains most of it. A portion of the more rolling western part drains to the Pomme de Terre, and some of the low, flat, slough country of the eastern part drains through Hawk creek into the Minnesota River below Granite Falls. A peculiar residual from the early River Warren action, is the Watson Sag, a low, marshy area cutting across from the Chippewa River to Lac qui Parle, whereby in high water times, the river may flow in that direction as well as in its normal course, thus making the elevated Watson Prairie an actual, large island.

Most of the land has been drained, so that now there are, in addition to Lac qui Parle, only two lakes in the county: shallow Buffalo (in early days, Shakopee) Lake in the northeast part of the county, and small, deep, rock-bordered and picturesque Carlton Lake, lying in the Minnesota Valley just below Montevideo. When settlers first came, however, there were many large sloughs, some with wooded shores, large enough to merit the name of lakes. The native trees were cottonwoods, willow, oak, elm, hackberry, black and burr oak and the thickets were of wild plum and hazel nuts.

Of these lakes, Black Oak was often mentioned in early history as a picnic spot and an overnight bivouac point upon the cut-off to Lac qui Parle from the regular Minnesota River trail. It lies four miles east of Montevideo, but for fifty years it has been drained and its bottom used as farm land. Other lakes mentioned in the early records were Willow, Dry Weather, and Lone Tree (also called Bad Water), all in the eastern part of the county.

As settlers first moved in (like the Indians, trappers and voyageurs before

them), their route was usually along the water-courses. By 1857, the old Military Trail from Mendota, along the south bank of the Minnesota River, through the last settlement of any size, New Ulm, past the Lower Agency, the Upper Agency, and the Lac qui Parle Mission to Big Stone Lake, had been cleared and improved to the point where it was called a road. Some travel was still carried on by water, but most of it had been taken over by the Red River cart, a vehicle famous enough to warrant special mention. It was two-wheeled, very crude but very strong, made entirely of wood and leather, with not one particle of metal used in its construction. As no grease was used on the axles, and movement was wood upon wood, it is said that the groaning of these carts could be easily heard for miles.

At the time of the Sioux Rebellion, which erupted in August of 1862, the only settlement in Chippewa County consisted of two men, an Englishman and a Frenchman, living a short way down the Minnesota River from the mouth of the Chippewa, near present Carlton Lake. The Indians are supposed to have attacked without warning and killed one of the men, but the other, though wounded, managed to escape. In 1865, the claim was taken over by Walter Carlton, and, in the cellar of the log cabin, which was still standing, he found the remains of the man who had been killed.

We know that the Amos Huggins, who came as agricultural adviser to the Indians with Dr. Williamson, when Lac qui Parle Mission was first established, was still living near the mission at the time of the massacre, probably across the river beside his corn fields. He, with his wife and a Miss Le Fambois, acted as teachers to the Indians. Huggins still had a family of two children.

August 19, 1862, while he was working in the field, two Indians came to the cabin and waited for him. When he returned with a load of hay, without a word, they shot him down in cold blood. Why they killed him but spared the rest of the family, no one will ever know.

Mrs. Huggins was allowed to take a few small belongings, including Mr. Huggins' missionary Bible, and she (with her children and Miss Le Fambois)', escaped, first to the home of a half-breed Chippewa named De Cota, who in turn took them to the lodge of a friendly Sioux, named Walking Spirit. He, in turn, helped them across the river to the home of a settler named Lagree. They reached his home the day of the attack upon Fort Ridgely, eighty miles down river, but still, so fast did news travel by word of mouth, that they heard all about the battle the same day.

From here Miss Le Fambois, joined and assisted by her brother, and disguised as a squaw, made her escape down to the settlement.

Mrs. Huggins and her children were soon asked to leave by Lagree, as he was afraid to shelter them longer. They returned to De Cota, but when he refused to take them in, they again made their way to the lodge of Walking Spirit. He and his wife befriended them and protected them from the other savages, until General Sibley and his military force pushed the Indians ahead of him up the valley and forced the release of all their prisoners at Camp Release between September 26 and 30. Reports of the number of prisoners vary, one estimate being 162 half-breeds and 107 whites, mostly women and children, among whom were included Mrs. Huggins and her two children.

After the backbone of the Rebellion was broken in 1862, settlers began to move into the country again, slowly at first, but soon in rapidly increasing numbers.

The first permanent settlement in the county was made, at what they called Chippewa City, by Walter and James Carlton and D. W. Wilkins. This was directly across the Chippewa River from what is now Montevideo. The first house

was built in 1865. In 1868 the village was platted, probably attaining the size of a half dozen houses by 1870.

The first Board of County Commissioners was named by the Governor in 1869, which meant that the county must have had a population, by then, of twenty-five qualified voters, as that minimum was necessary in order to qualify as a county. The first county seat was located in Chippewa City.

However, by the following year, a new and larger village had sprung up on the east bank of the river and this was named Montevideo.

Various stories as to the derivation of the name are extant. A fallacious one is that it was named after Montevideo, Uruguay, but this theory has been advanced only since the development, during the last few years, of the Fiesta theme, and, with it, the good-will accord between the South American and the North American Montevideos. Our early settlers included several men of considerable learning, and, it is said that one of these Latin scholars, reputedly Lycurgus R. Moyer, stood—one day—upon the east bluff of the Chippewa River, looking down over the beautiful valley below him, and, possibly exaggerating the height of the hill on which he stood, brought forth the name, "I See from a Mountain," or in Latin, "Monte Video."

The real founder of the village was G. W. Frink. In 1866, he had made his first trip up the Minnesota River from the settlements, by ox-team. Again, that same fall, he came with his twelve-year-old son, probably Oscar, who was later to be the first boy from the county to study medicine. He described these early trips very graphically in a letter in the *Montevideo Leader* of June 21, 1895.

He told of their camping in the timber along the river, with a rifle always at hand, constantly on guard against possible attack by the savages.

His third trip, from his home in Morristown, Rice County, was with a party of thirteen, eight of whom were women and children. This was early enough in March so they encountered bad snow-storms, and much of their time was spent, so he said, in floundering, wallowing and shoveling in the snow, finding refuge some nights in settlers' cabins and some nights at deserted shacks. Finally, after seventeen days of struggling, they reached the G. W. Wilkins house in Chippewa City. All were exhausted and chilled, and some had frozen fingers and toes; consequently, even a sod house looked like a palace to them.

I quote from his letter: "Everything needed for existence had to be brought from New Ulm, 85 miles away. The prairie sod had to be broken. But what a delight it was to see the country settle up, to hear the lowing of cattle, the tinkle of the sheep bell, the sound of hammer and axe, and finally the puff of the Iron Horse. The Indian and buffalo are gone, replaced by civilization. The schoolhouse replaces the teepee, the church bell the savage war cry. A civilized and a prosperous community now occupies that splendid prairie region, and we feel an abiding interest in the town and country we helped build out of the wilderness."

(To be continued)

Minnesota Academy of Medicine

Meeting of January 13, 1954

The regular monthly meeting of the Minnesota Academy of Medicine was held at the Town and Country Club Wednesday, January 13, 1954. Dinner was served at 7 p.m. and the business meeting was called to order at 8:20 p.m. by the President, Dr. E. A. Regnier.

There were forty-one members and two guests present.

Minutes of the December meeting were read and approved.

The Secretary read the minutes of the Executive Committee meeting of December 9, 1953.

Votes were requested on the four new amendments to the Articles of incorporation and By-laws, and these were carried.

Dr. Regnier announced the death of Dr. Philip Donohue.

Joseph A. Maun of the firm of attorneys Bundlie, Kelley, Finley and Maun, St. Paul, was detained in the East, and his paper on "The Physician and his Taxes" was given by William R. Busch, an attorney of Mr. Maun's firm.

THE PHYSICIAN AND HIS TAXES

WILLIAM R. BUSCH

Saint Paul, Minnesota

Taxation is today such an integral part of our business and personal life that there is hardly a facet of our existence which is not affected, and to some degree regulated, by at least one of the many and diverse forms of revenue laws which the federal, state and local law making bodies have adopted. Thus regard for a moment the fact that the deed to your home and to your other real estate, the stocks and bonds in which you have invested, the safe deposit box in which you keep your valuables, the gasoline which you burn in your automobile, the tobacco you use, the telephone and cable service which you employ in your business and personal affairs, along with virtually countless other items, are all subject to federal taxation, and in addition, in most instances, to a state levy of substantial size.

The most important taxes, however, are the ones that are levied on the incomes we earn, the property we dispose of by gift, and the estate we leave at our death. Of these three, the income tax has beyond question the greatest significance. First of all, its rates are extremely high, and it is of never ending application. (Even death does not toll this tax, for immediately upon the taxpayer's death, a successor taxpayer comes into being in the form of his estate and it must return a tax on all income received after death which is not subject to income taxation in the hands of the taxpayer's heirs.) Secondly, and more importantly, the income tax is so widespread in application and complex in construction that a taxpayer simply cannot afford to proceed oblivious of its effects on his activities. With a graduated tax rate that starts at 20 per cent and ranges as high as 91 per cent, it seems clear that the unwitting loss of an allowable deduction, or the taxation as ordinary income of what is in reality a return of capital, or some other of the mis-steps which so frequently occur in the cases of unwary taxpayers, will at least unnecessarily dissipate the taxpayer's resources and may produce financial disaster where the amount involved in the lost deduction, the return of capital or whatever the item may be, is substantial in size.

If there is to be any meaning to the concept of equality in justice, remember that laws must be interpreted and applied by the courts in a consistent fashion and in accordance with the terms of the statute involved. Therefore, if you permit your transactions to be in such form that they fit within a provision of the law that was never intended to apply to them with the result that a larger tax than would otherwise be due is assessed against you, do not anticipate any relief from the courts. The courts have said again and again that although the taxpayer need not choose the most expensive way or form of operation from a tax point of view, having made his choice he will be bound to pay the tax consequences that follow.

It is the object of this discussion to cover some of the highlights of the vast body of law that has developed around the federal and state income tax statutes particularly as applied to the special problems confronting the medical practitioner.

1. *Adequate records are essential to a sound tax program.*

Perhaps the most fundamental need which the medical practitioner, or for that matter any business or professional man, is faced with in connection with his income tax matters, is the necessity for reasonably accurate accounting records. If these are not available in a form which will substantiate the correctness of the gross income which you report and the deductions which you claim, then you are needlessly prejudicing yourself and are paving the way for troublesome tax controversies. Incomplete or otherwise inadequate records give the

Commissioner of Internal Revenue the license to reconstruct your income and your deductions in accordance with his best judgment in the matter. Needless to say, his determinations will tend to favor the government.

One of the first things any examining revenue agent will do when checking the tax return of a doctor, is to compare the receipts reported in the return with the deposits disclosed by the doctor's bank statements. If these cannot be reconciled (and in the absence of detailed cash receipts records and a uniform procedure of depositing receipts in the bank, it is unlikely that it can be done) you will have a difficult job of explaining to do if you are to avoid being taxed for additional income.

The only really satisfactory approach to this record-keeping problem is to have a simple but complete accounting system installed in your office and then see to it that it is operated so as to produce a permanent record of your business receipts and disbursements with a minimum of accounting frills. Any costs incurred in this regard should be many times repaid by the elimination of the tax controversies you are otherwise almost certain to experience.

Among the standard steps that are normally involved in placing a medical practice on an efficient bookkeeping basis are two that are particularly significant from a tax point of view. The first consists of completely separating your personal and business checking accounts so that only business items clear through your office account. The purpose of this is to eliminate the possibility of personal expenses being mistakenly included in business deductions and at the same time to reduce the record-keeping chore of the person who handles the cash disbursements records for your practice.

The second step consists of establishing an inviolable rule that all business receipts must be deposited intact in your business bank account. The frequency with which the deposits are made will depend to some extent on your billing and collection methods. But in any event, they should be deposited at least once a week. Every dollar received as business income should find its way into your bank account and under no circumstances should any expenses, whether business or personal, be paid directly from receipts. If you follow this recommendation, you should experience no difficulty in explaining the relationship between your business income and the deposits to your bank account.

Historically, medical practitioners have determined and reported their income on the cash basis of accounting. In most instances, this is the only feasible method because of the uncertainty of collections. Having elected to report your income on this basis, all payments that you receive in any given year represent taxable income for that period without regard to when the services for which the payment was made were rendered. This means that it is possible for your taxable income to fluctuate substantially from year to year even though your total services rendered maintain a fairly constant level throughout the cycle. This is one of the inherent shortcomings of the cash basis of accounting, but fortunately it does not occur often enough or in a sufficiently pronounced form to make it a serious problem. If you have contemplated changing to the accrual method of accounting under which you pick up the income as the services are rendered, be certain to note that the Commissioner's approval must first be obtained.

To complete your bookkeeping requirements, it is necessary for you to have a record of all items of non-business income that you receive during the year. If your office staff is capable of handling it, this chore can be most painlessly carried on as an adjunct to your business books. Separate accounts can be established to record the non-business income and the receipts themselves can be deposited in your business checking account. If you cannot arrange your affairs in this pattern, be certain to maintain some permanent log so that when tax return time arrives you will have a correct record of your total non-business income.

One last point that should be noted in connection with your income tax records is that the best way to insure the full allowance of all deductible business expenses is to pay them by check. The same rule applies to personal items which the Internal Revenue Code permits you to deduct in computing your income tax liability. This is particularly so in the case of contributions. If they are supported by cancelled checks they will be beyond challenge; if they have been paid in cash, you will more often than not find it virtually impossible to obtain their full allowance where they are substantial in size.

2. Tax returns must be properly prepared and timely filed if penalties are to be avoided.

The object of your bookkeeping system is to produce an easily substantiated statement of your business receipts and expenses, so that when you prepare your income tax return you will be in a position to do so with the assurance that only adequate records can supply. The tax return itself is in reality nothing more than a specially designed statement of income and disbursements. Yet for most of you, it is probably as difficult to digest as is a medical chart to those of us who are uninitiated in your profession. For this reason, a good many doctors, particularly those who have been through the mill, as it were, with a revenue agent, have found it most economical in the long run to seek specialized assistance in preparing their returns. Whether or not this is necessary in your particular case will depend to a large extent upon the size and complexity of your income and the extent to which you are willing to risk potential tax difficulties.

Because of the specialized nature of a tax return, it will serve no good purpose to devote any time to considering the details of the various returns which you are required to file each year. However, because substantial penalties will attach if you fail to comply with the filing requirements, a word or two appears in order as to the rules covering the filing of returns.

You are all undoubtedly long since reconciled to the fact that by March 15* of each year your state and federal income tax returns covering the preceding calendar year must be filed. But this is only half the

*The 1954 Internal Revenue Code changed this filing date to April 15.

job, for you are also required to file a declaration of estimated tax on your income for the current year. Failure to file this declaration by March 15th will result in an immediate penalty of 5 per cent of each installment due but unpaid. This penalty increases to a maximum of 10 per cent depending on the length of time elapsing before your declaration is filed.**

Hand in hand with the requirement of a declaration is the statutory provision specifying that your estimated tax must be at least 80 per cent of your final tax liability for the year.† If it is not further penalties are encountered. In general, these amount to 6 per cent of the difference betwen the estimated tax paid and the actual tax liability.

Because of the magnitude of these penalties where the ultimate tax liability is substantial, a very real burden is placed on the practitioner whose total income is exempt from the withholding tax and hence entirely subject to the estimated tax provisions of the Code.

There are, however, two avenues of approach, either one of which if correctly followed should eliminate any chance of a penalty being imposed. The first, which is specifically provided for in the Internal Revenue Code and is by far the safer of the two, consists of determining your estimated tax liability for the current year on the basis of the immediately preceding year's income and deductions and the current year's tax rates, exemptions and dependency credits. If the installments of the tax estimate determined in this fashion are timely paid, no penalty can attach even though your actual net income for the year and your resulting tax liability far exceeds what has been estimated.

The second procedure designed to eliminate underestimation penalties consists of filing your declaration on or before March 15 disclosing a tax liability of a more or less arbitrarily chosen amount and then amending this estimate by January 15 of the next year to bring the total estimate to at least 80 per cent of your actual tax liability. Some people have used the so-called dollar estimate approach which consists of declaring an estimated tax of a nominal amount payable in four equal installments.§ So long as such a declaration is amended to increase it to 80 per cent or more of the year's actual tax liability by January 15 of the next year, a literal compliance with the Code requirements appears to exist. However, it would seem discrete to declare a more realistic amount than this lest the Commissioner attempt to penalize you for violating the substance of the Code requirements. Although it is perhaps doubtful that the Commissioner would be successful in making this penalty stick, the taxpayer is nonetheless risking its assertion and the expense incident to the resulting tax controversy.

A final point to be noted in connection with the estimated tax penalties is that the penalty for underestimation applies to the difference between your estimated tax and your tax liability as ultimately determined and not as disclosed in your tax return.‡ Thus, if a substantial portion of your deductions are disallowed, or if the examining agent succeeds in including additional income, you will be subject to an underestimation penalty if your estimate was set at the bare minimum of 80 per cent of your reported tax.

Before turning to the substantive aspects of the tax law, it seems worth while to briefly consider the matter of how long the records in support of your tax returns should be retained. To a large extent this is a function of the statute of limitations applicable to income tax matters. Ordinarily this limitation period is three years from the date the return is filed. However, if you omit income in excess of 25 per cent of the gross income disclosed in your return, the limitation period is automatically extended an additional two years.§§ For this reason it is best to retain your records for at least five years after the return for the year in question is filed.

Since the statute of limitations on contract indebtedness is six years in Minnesota, your cancelled checks covering the payment of your expenses should be retained for at least that period of time to protect you against the possibility of having to pay a debt twice. This is of course a matter of local law and does not concern your income taxes, but it should be kept in mind in determining when you can safely dispose of your old records.

3. Certain types of receipts are not subject to income taxation.

In considering the various substantive aspects of our income tax laws it seems logical to start with a summary of the principal types of receipts that are excluded from taxable income.

One of the most widely discussed of these is the interest which is paid by a state or local governmental body on its bonds. Such interest is specifically exempted from federal income taxation and for this reason the yield on these bonds is very measurably less than the yield on a comparable corporate bond. Thus to a person in the 50 per cent bracket, a 3 per cent municipal bond will produce as much net income after taxes as will a corporate security on which the cash income runs at the rate of 6 per cent a year.

In connection with these tax exempt municipals it should be borne in mind that the Minnesota income tax

**This penalty is not found in the 1954 Code.

†The rules governing the penalty for substantially underestimating tax liability have been completely redrafted in the 1954 Code. Thus now the estimated tax must be only 70 per cent or more of the tax disclosed on the return filed for the period involved. In addition, the penalty which is at the rate of 6 per cent a year on the amount of each underestimation is not to be imposed if the estimate equals 70 per cent of the tax liability shown on the last year's tax return or 70 per cent of the tax that would be due at current tax rates and exemptions on the basis of the net income shown on last year's return.

§This is no longer permitted. The 1954 Code measures under estimations for each quarterly installment so that each payment seemingly must equal at least one-fourth of the minimum estimate tax payment required for the year.

‡This has been changed by the 1954 Code so that the tax shown on the return filed for the year is the measuring stick for the estimated tax requirements.

§§Under the 1954 Code, the extension is three years so that the total limitation period becomes six years in such cases.

law does not extend the exemption to bonds issued by other states or their subdivisions; hence, if you invest in outstate municipals you can properly exclude the interest from your income only in calculating your federal tax liability. For state tax purposes such interest is subject to the same rules as that received on ordinary securities. It should also be noted that the profit or loss which is realized on the sale of a municipal bond is not tax exempt and is includible in income in the same manner and under the same rules as gains or losses on the disposition of any other capital asset.

A second type of non-taxable income is the proceeds of a life insurance policy which matures by reason of the death of the insured. Where the right to receive the proceeds of the policy was acquired by purchase, a slightly different rule applies but this is a situation you are not likely to encounter.

If the insurance settlement provisions call for monthly installments instead of a lump sum payment, taxable income is not realized even though the aggregate of these installments exceeds the face of the policy at the time of the insured's death.* On the other hand, if the policy proceeds are retained by the insurance company at interest with a periodic payment of the interest to the beneficiaries, the total of these payments is taxable income as and when received, even though substantially the same monthly payments could be scheduled under the installment settlement provisions of the policy and be entirely non-taxable.

This divergency in tax treatment is well worth considering, particularly where the amount of insurance is large and the income tax bracket of the recipient significant. There are, of course, instances where good estate planning calls for the retention of the principal of the life insurance policy in order to adequately protect the secondary beneficiary. In such cases the tax disadvantages of this procedure cannot be avoided. However, ordinarily a periodic or installment settlement provision can be arranged which will produce approximately the same result as will retention of the policy proceeds at interest. In these situations the tax economy of the former method will normally dictate its use over the latter type of settlement option.

One further point, with reference to life insurance, concerns the so-called dividends which the mutual companies pay each year on their outstanding policies. These dividends are regarded for tax purposes as reductions in the policy premiums which is in reality what they are. Consequently, these dividends are not includible as taxable income regardless of whether they are received currently in cash or permitted to be accumulated and paid out when the policy matures.

Another important type of non-taxable income arises in connection with annuities and other insurance policies which mature for reasons other than the death of the insured. Payments received under such policies represent taxable income in part and a non-taxable return of capital to the extent of the remainder. The rule is that so much of the annual annuity as is not in excess of three per cent of the annuitant's cost basis in the policy is treated as taxable income. The balance of each year's receipts from the policy is exempted from tax until the full cost basis has been recovered. Thereafter, the entire amount received is taxable as ordinary income.** If the policy is surrendered for a lump sum payment, no income is realized except to the extent that the amount received exceeds the total net premiums which have been paid on the policy. Any excess is taxable as ordinary income and is not subject to being treated as capital gain regardless of how long the policy has been held.

Among the other types of non-taxable receipts that you are likely to encounter are: (1) damages or awards for personal injuries; (2) veteran's benefits; and (3) gifts and inheritances. The latter class of receipts is subject to special types of taxation which we will briefly review towards the end of this discussion.

4. *Capital gains and losses are subject to different treatment from ordinary income.*

The next phase of income taxation that appears to warrant consideration is the favorable treatment in the form of a substantially lower tax rate which is accorded gains or losses realized on the sale or exchange of capital assets.

In general, a capital asset is any property, whether or not used in a trade or business, which is not part of the taxpayer's stock in trade or his inventory and is not a literary, musical or artistic composition or a copywrite thereof which the taxpayer produced through his personal efforts. Governmental obligations which are issued at a discount without interest (e. g., the Treasury's E bonds) are specifically denied capital asset status.

Depreciable business property (such as your office equipment and your business automobile) is subject to a special rule. If it has been held for more than six months prior to the time of disposition, the taxpayer has the privilege of treating the gain from the disposition of such property as a capital gain, provided he similarly treats the gains and losses from all such depreciable property sales and any property involuntarily liquidated during the period. If a net loss is suffered on the sale of the depreciable assets, this loss is deductible as an ordinary business expense.

The procedure for handling capital gains for tax purposes has recently been modified so that now short term capital losses and long term capital gains are offset one against the other at one hundred cents on the dollar.

In addition, a net long term capital loss is no longer

*The 1954 Code has eliminated this tax saving possibility by subjecting to an income tax the excess of the aggregate installments over the lump sum value of the policy at death. An exception is allowed in the case of the surviving spouse of the insured who is permitted to receive annually without tax $1,000 plus that portion of the policy face value which is properly allocable to that year.

**The so-called "three per cent rule" has been eliminated by the 1954 Code and the tax free portion of each year's annuity payments is now calculated in effect by dividing the cost basis of the annuity policy by the remaining life expectancy of the annuitant at time of retirement or, in the case of a term policy, by the number of years in the term. This provides a much more equitable capital recovery pattern than was available under the old law.

subject to any percentage reduction, and may be carried forward in its entirety against the capital gains and income of subsequent years to the extent that it exceeds the maximum capital loss deduction of $1,000 in the taxable year in which it occurs.

In dealing with capital gains and losses, one of the more troublesome factors is determining the cost basis in the property disposed of. The only effective way to minimize this difficulty is to keep reasonably complete records of the original cost of the property, the amount, if any, of subsequent improvements or additions, and the amount of any allowable depreciation or other form of capital recovery. In addition, your records should show the time of acquisition and a notation of the serial number of the property if it is otherwise unidentifiable from other items of the same type which you own. If such records are not kept, you will be forced to guess at this information when you file your tax return for the year of sale. These estimates will be easy prey for an examining revenue agent and you will be hard-pressed to prove error in any changes which he proposes to make.

If you have acquired the property by gift, your basis is a substituted one that depends on the cost basis of the property in the hands of the person who gave the property to you. If the property is of any substantial value, it will behoove you to ask the donor his cost basis in the property. Perhaps you will be most commonly exposed to this problem in its reverse form—you will be the donor. In such case you can measurably increase the value of the gift by making available to the donee the information necessary to establish your cost basis in the property which then becomes his cost basis. Otherwise, the Commissioner of Internal Revenue is authorized to use his reasonable estimate in determining the donee's gain on disposition of the property and, as you can no doubt appreciate, the Commissioner's estimation will tend to favor the revenue.

Where property is acquired on the death of the owner, either under the provisions of his will or by virtue of the intestacy laws of the state, the fair market value of the property at the time of the owner's death becomes the basis for tax purposes of the recipient. This amount will generally be determined by the inventory value placed on the property in the Probate Court proceedings relating to the decedent's estate. However, if a federal estate tax return was filed and disclosed a higher value, or a higher value was placed on the property in determining the ultimate estate tax liability of the decedent, this amount becomes the basis.

5. *Joint tenancy, a boon or a boomerang.*†

At this point a comment or two seems appropriate on the value taxwise of the joint tenancy form of holding real or personal property.

As perhaps you have heard, from a property law point of view, the surviving joint tenant takes title to the whole of the property by virtue of the original conveyance of the property to the joint tenants. Title to the property is not considered to be acquired from the deceased joint tenant. However, this concept is not carried over into the estate tax branch of the law and valuable property interests are regarded as passing from the decedent on his death. As a result the fair market value of the property at the date of death is includible in hsi taxable estate except only to the extent that the consideration for the acquisition of the property was supplied by the surviving tenant. Therefore, where the deceased joint tenant supplied the total purchase price for the property, it is the same for estate tax purposes whether he held the property as sole owner at the time of his death or was a joint tenant. In either case, the full value of the property is includible for purposes of valuing his estate for estate tax purposes.

On the other hand, for income tax considerations, the property is viewed as being acquired by the surviving tenant in the fashion that the real property lawyer would look at it. As a consequence, the basis of the surviving tenant is the cost basis of the deceased tenant plus any consideration which the survivor may have supplied.

To illustrate this point, consider the husband and wife who purchased a home twenty years ago for a total price of $10,000. The husband supplied the entire consideration for the home and had it placed in joint tenancy in the hope of protecting his wife in the event of his death. On the husband's subsequent death, the wife, by virtue of the real property laws of the state, acquires full legal title to the house which is then, we will assume, worth $20,000. The full $20,000 is includible in the husband's estate for purposes of death taxes in the same manner as it would be had the husband owned it outright.

The disadvantage inherent in this type of property holding is immediately apparent when it is considered that the cost basis for income tax purposes to the surviving joint tenant in the example which we have used here is $10,000. Hence, if she is forced to sell the home she will have a $10,000 capital gain where the sale is made at the $20,000 fair market price that is used for state tax purposes. If the surviving widow has no other income, and this is generally not the case, and if she does not invest the proceeds of the sale of the house in a new residence, she will pay an income tax on the house sale of approximately $1,000. The amount of this tax will of course be measurably increased as the other income of the widow is multiplied.

The point to remember is that if the husband had held the property in his own name, the widow would have had no gain on its sale since her basis would be its fair market value. As a result she would have paid no income tax on account of its disposition. The tax that she does pay is the price exacted for using the joint tenancy method of title holding.

6. *Comments on business deductions.*

The mine run of business expenses present no problem at all. They are easily identifiable both by the taxpayer

†The following paragraphs are now of only historical concern since the 1954 Code removed the income tax inequity previously inherent in joint tenancy situations. The value at date of death rather than the decedent's cost basis is now prescribed as the surviving tenant's basis for gain or loss where a substituted basis in the property is called for.

and by the examining revenue agent as being allowable deductions, and the amounts thereof are subject to fairly exact calculations. The important point to be remembered is that a failure to keep reasonably adequate and accurate records will render even the most standard expense item a difficult one to establish for the amount thereof will then be left to guesswork and the burden is on the taxpayer to establish the facts.

In the practice of medicine, as in most other professional lines, the taxpayer encounters difficulty in only three or four areas of business deductions. For this reason we will confine our discussion of expenses to these items.

(a) Depreciation charges if fairly arrived at should no longer be subject to dispute by the Internal Revenue Service. The allowable depreciation charge on business furniture and equipment has long been recognized as a more or less annoying source of trivial adjustments in the tax liability of the practitioner. Depreciable life is at best an educated guess which has at times been imbued with a scientific aura by the application of mathematical formulae designed to divide the cost basis of the asset over its estimated life for recovery out of income. Most of you have undoubtedly had the experience of trying to establish that the life expectancy which you have assigned to a particular asset should be accepted instead of the longer life which the examining agent has like as not proposed. Usually the matter is resolved by your consenting to some small adjustment in your depreciation charge in order to wind up that year's tax liability. This you do even though convinced that your guess as to the life of the asset is much more realistic than that of the agent's—the cost of carrying the dispute further is usually more than the tax involved.

Since spring of 1953, this situation has been by and large eliminated. The Commissioner of Internal Revenue has directed his personnel to accept the taxpayer's depreciation figures unless they are obviously unreasonable. Therefore, if you are fairly realistic in your writeoff period and follow it consistently, you should have no trouble. If you assign a life of eight years to an asset which someone else might regard as having a life of nine or ten years, your calculations should be beyond change by the examining agent. On the other hand, if the life of the asset may reasonably be regarded as fifteen years you are treading on paper thin ice.*

(b) Automobile expenses should be no problem if you are realistic in your approach. The difficulties that may arise in connection with the deduction of automobile expenses can be minimized if your percentage assignment of the use of the automobile to your practice leaves some room for personal use where there is only one automobile in the family. If you have a two car family, then the allocation of 90 per cent or 100 per cent of your business car depreciation and operating costs as a deductible expense should meet with no substantial objection by the examining agent, unless your mileage indicates that you have been using the business car for vacation trips and other extended non-business purposes.

The use of charge accounts covering the operation and maintenance expense of your business automobile will eliminate the bulk of what can otherwise be a tedious record keeping procedure. It is well to have the family automobile serviced at a different garage or station if credit accounts are used. Otherwise you are running the risk of having your business expense records challenged as containing personal car expenditures.

(c) Business entertainment and promotion deductions require careful attention. The most prolific source of all administrative and judicial conflicts relating to the allowable business expenses of professional people is the entertainment and promotional expense category. Basically the problem is one of establishing that the expenditure which you claim is an ordinary and necessary one to the proper conduct of your practice. On occasion you will meet with an examining agent who claims that because it is unethical for a doctor to advertise, he is thereby precluded from any entertainment or promotional deduction. Fortunately, this is not the law, and there is no question that such a deduction is allowable if you can establish that the claimed expenditures were reasonably designed to advance or maintain your practice.

The crucial factor is that of proof and this will be complied with only if you maintain a fairly comprehensive log of the principal entertainment expenditures that you make, including the occasion, the persons entertained and the amount expended. The use of club memberships and courtesy accounts at the restaurants where you do the bulk of your entertaining will do much to minimize the record keeping burden. However, it is essential, particularly in view of the current attitude of the Internal Revenue Service toward this type of deduction, that you preserve with your club and restaurant expense statements a notation as to the identity of the groups entertained. Without this information it is very difficult to establish the requisite association between any given expenditure and your business; and without this association the deduction will not stand.

A good case in point is one involving a Dr. Richard A. Sutter, which was decided by the Tax Court of the United States on October 30, 1953. In that case, the doctor had claimed deductions for the following types of promotional and entertainment expenditures: (1) gifts to elevator operators, parking lot attendants, hospital employees and others; (2) the costs incurred on a hunting trip; (3) the gifts which he had made to medical associates; (4) the expenses incurred in connection with publishing an article dealing with his phase

*The 1954 Code liberalizes depreciation charges by permitting accelerated rates to be applied to new business property acquired after December 31, 1953. Depreciation as to such property may now be computed by the sum of the digits method, the declining balance method utilizing a rate not more than twice the permissible straight line rate, or any other recognized procedure which writes off the asset during the first two-thirds of its life no faster than would be permitted under the declining balance method.

of the practice of medicine; (5) the cost of luncheons attended in connection with Chamber of Commerce and hospital association work; (6) expenditures incurred in business entertainment; and (7) the depreciation and cost of maintenance of a cabin cruiser used in conjunction with his business promotion activities.

Of these seven categories of expenses, but two were allowed, and these only to the extent of 25 per cent of the amounts claimed. As to the first four classes of expenses, the Court affirmed disallowance on the ground that there was no adequate proof of any direct connection with the taxpayer's business. As to the cost of the luncheons which consisted almost entirely of the taxpayer's own meals, the Court concluded that there was no proof that the amount expended was in excess of what the taxpayer would have paid for his food if he had not attended these luncheons (the expenditure was thus reduced to a personal one which is expressly disallowed as a deduction by the taxing statutes).

Insofar as the entertainment expense deduction was concerned as well as that relating to the cabin cruiser, the Court arrived at the 25 per cent allowance figure on the theory that the rest of the expenses involved represented the amount reasonably allocable to the entertainment of a purely social nature and that which was designed to establish good will for the taxpayer's business.

The doctor in question was an industrial surgeon whose clinic serviced the needs of various industries and their insurance carriers. By the very nature of his practice the doctor was in a position to fairly easily establish the relationship between the entertainment of various employers and insurance representatives and the profitable practice of his specialty. His misfortune in having a substantial part of his claimed deductions disallowed is attributable largely to a failure of proof that you can avoid in your own case if you are willing to maintain the proper records to substantiate the deductions which you claim for this class of expense.

If the bulk of your practice or at least the significant part of it consists of referral cases, the cost of entertaining the doctors who actually refer patients to you or who are in a position to do so, should be fairly easily established as being closely related to the effective conduct of your practice and hence deductible to the full extent. The same would apply to entertaining patients where the relationship betwen the income produced and the outlay incurred is not unreasonable.

Unfortunately, there is and probably can be no hard and fast rule by which you can gauge the amount which will be ultimately allowed as a deduction for this entertainment and promotional type of expenditure. However, you can be certain that as the aggregate of your expenditures reaches substantial proportions when related to your gross revenue and the type of practice you engage in, the need for supporting records becomes more and more significant since the deduction will almost certainly be challenged by the examining agent.

7. *A comment or two on gift and estate taxes.*

Although the principal subject of this discussion has been income taxation, it seems appropriate by way of conclusion to comment briefly on the two other types of taxes which are likely to have a substantial impact on your affairs. The first is the gift tax, which is a levy on the right to gratuitously transfer property during life. The other is the death tax (either in the form of the federal estate tax or the state inheritance tax), which is applied to transfers of property at or by reason of death.

These two transfer taxes are so geared that the gift tax's rate is approximately three-quarters that of the death tax on any given value of property. In addition, both taxes are of the graduated type so that as the amount given increases the tax rate percentage climbs sharply. Because of these two factors it is possible in many cases to realize considerable savings in the total transfer tax burden by disposing of a portion of one's property to one's beneficiaries during life rather than retaining the whole estate so that it passes entirely at death.

Since 1948, when Congress authorized the joint return for income tax purposes, a so-called marital deduction is available for gift and estate tax purposes. The allowance of this deduction has opened up new vistas insofar as estate planning is concerned. The tax disadvantages formerly attendant on the transfer of a substantial portion of one's estate to his wife have been removed and the law now encourages the equalization of the estates of the husband and wife so that disproportionate tax burdens formerly occasioned by the husband's having the bulk of the family property can be avoided. To facilitate this, Congress has provided for the treatment of one-half of all qualified gifts to the donor's spouse as tax-free regardless of whether the gift is made during life or occurs at death. The only pre-requisite is that the relatively simple conditions surrounding the allowance of the marital deduction be complied with.

The satisfaction of these pre-requisites to the use of the marital deduction is one of the jobs to be fulfilled in the planning of your estate. How it will be handled in any particular case is of course subject to no set rule since it will depend upon a number of variables including the special objectives of the person involved, the size of his estate in relationship to that of his wife, and the number and age of his children. The significant point is that the tax savings occasioned by the use of the marital deduction can be assured if one but takes the time to plan his affairs.

It is not feasible here to list or discuss the various other factors which must be given due regard in planning the disposition of your property. It must suffice to say that they will probably include such fundamental procedures as the establishment of trusts to handle property which passes at death to minor children and the preparation and execution of appropriate buy and sell agreements covering your professional practice, where it is carried on in conjunction with others. The important thing both from the point of view of assuring peace of mind to you and your survivors as well as of assuring that no unnecessary gift or death taxes are

(Continued from page 773)

In Memoriam

WILLIAM AARON BESSESEN

Dr. William A. Bessesen, dean of the International College of Surgeons and widely known for many years as a Minneapolis surgeon, died at his home at 2222 Pillsbury Avenue, August 14, at the age of seventy-four years.

After six years of practice in Albert Lea and two years as assistant in surgery to Dr. William J. Mayo at Rochester, he came to Minneapolis nearly thirty-five years ago and remained in practice there. He had specialized in heart disease as well as in surgery and had also engaged in general practice. He had traveled widely to attend medical meetings in many parts of the world and had enjoyed an extensive acquaintance among physicians in many countries.

Dr. Bessesen was born in Freeborn county and attended school in Albert Lea. He received a B.A. degree from the University of Minnesota, and a master's degree in science from Northwestern University. He was graduated in medicine from Northwestern in 1905 and served his internship at St. John's Hospital in Fargo, with further postgraduate training at St. Mary's Hospital and at the Mayo Clinic in Rochester.

In 1915 Dr. Bessesen was married to the late Beatrice Gjertson, an opera singer, and both were prominent in social, art and musical circles in Minneapolis for many years.

Dr. Bessesen was a life member of the Hennepin County Medical Society, the Minnesota State Medical Association and the American Medical Association. He was a member of the staff of Eitel Hospital and had served as president of the Cosmopolitan Arts Club.

Survivors are, four sons, William Aaron, Washington, D. C.; Henry Adrian, Chicago; John Truman, Minneapolis, and Paul Stanford, Los Angeles, and two daughters, Mrs. Monica Bjornnes and Mrs. Delna Arnold, both of Minneapolis.

OTTO EMIL HUBBARD

Dr. O. E. Hubbard, well-known Brainerd physician, died suddenly at the home of his daughter, Mrs. Julius Twist, in Des Moines, Iowa, July 21, 1954. He was fifty-six years old.

Dr. Hubbard was born in Aurora, Illinois, and had lived in Brainerd for forty-five years. He attended high school there and was graduated in medicine from the University of Minnesota. He served in the Armed Forces during World War I and returned to Brainerd to practice medicine and surgery after graduation from medical school.

He was a member of the Upper Mississippi Medical Society, the Minnesota State Medical Association and the American Medical Association, also the Elks lodge and the Masons.

Survivors include his wife, Mrs. Nella K. Hubbard; one daughter, Mrs. Julius Twist of Des Moines; one brother, Fred Lyscio of Brainerd and, one grandson, Steven Twist, also of Des Moines.

WILLIAM HENRY HENNEY

Dr. William H. Henney died at the age of seventy-six at his home in McIntosh after thirty-five years in general practice there.

He had been health officer for McIntosh and nearby Winger, Erskine and Mentor for thirty years. He had also served as mayor of McIntosh for twenty-three years. When he retired from active practice because of ill health last spring, "Dr. Henney Appreciation Day" was proclaimed by the town and friends came from a wide area to honor the veteran physician.

Born in Cedar Rapids, Iowa, Dr. Henney attended high school in Redfield, South Dakota, and then taught school for a year before entering the University of Nebraska medical school. He succeeded in working his way through medical school, graduating in seven years. After that he practiced briefly in Thedford, Nebraska, and later in Beltrami county and at Fertile in Polk county before settling permanently in McIntosh. He was a member of the Red River Valley Medical Society, the Minnesota State Medical Association and the American Medical Association and of Our Saviour's Lutheran Church.

Surviving are his wife, Lydia; two sons, two daughters, three stepchildren, and twelve grandchildren.

WILLIS STORRS LEMON

Dr. Willis S. Lemon, former chief of the chest department of the Mayo Clinic, died August 19, 1954, of a heart ailment in Roanoke, Virginia. He was seventy-six years old and had retired from the Clinic in 1947.

Dr. Lemon was born at Villa Nova, Ontario, and was graduated from Aylmer Collegiate Institute at Aylmer, Ontario in 1896. He received his medical degree from the University of Toronto Medical Faculty and served his internship at the Toronto General Hospital with three years' postgraduate work at the Ontario Sanitorium for Tuberculosis. He practiced for eight years at LaGrange, Illinois, before joining the Mayo Clinic in 1917.

Surviving are his wife, Ethel Haines Lemon; a son, Dr. Willis E. Lemon of White Sulphur Springs, West Virginia; a daughter, Mrs. Katherine Lord of Hanover, New Hampshire; and two brothers, Dr. W. M. Lemon, LaGrange, and Dr. A. Ray Lemon of Aylmer, Ontario.

✦ Reports and Announcements ✦

MEDICAL MEETINGS

State

Physicians and Schools, First conference, University of Minnesota Center for Continuation Study, Minneapolis, December 2-3, 1954.

Sectional

Minnesota State Medical Association, Annual Meeting, Minneapolis, May 23, 24, 25, 1955.

American College of Surgeons, sectional meeting, The Fort Harry, Winnipeg, Manitoba, Canada, April 25-26, 1955.

National

American College of Chest Physicians, Seventh annual postgraduate course, Hotel New Yorker, New York City, November 8-12, 1954.

American College of Surgeons, Fourth clinical session, Atlantic City, New Jersey, November 15-19, 1954.

American Medical Association, Clinical Session, Miami, Florida, Nov. 29-Dec. 2, 1954.

American Medical Association, Annual meeting, Atlantic City, New Jersey, June 6-10, 1955.

National Society for Crippled Children and Adults, Statler Hotel, Boston, Massachusetts, November 2-5, 1954.

PR INSTITUTE

The AMA's Public Relations Institute in Chicago, September 1 and 2, attracted almost 300 state and county medical society representatives. Among those attending the "crackerbarrel Institute" from Minnesota were Harold W. Brunn, Assistant Executive Secretary, and Joyce Pearson, Director of Public Relations, both from Minnesota State Medical Association, and Naomi M. Peterson, Assistant Professor, School of Business Administration, University of Minnesota, Minneapolis.

The Institute, planned primarily for lay executive and PR personnel, M.D. chairmen of PR committees, and Auxiliary PR committee women, was the most successful ever held. The two-day meeting featured experts in medical television production, direct mail promotion, AMA services, medical fees, the role of medical assistants, medical motion pictures, and inter-organizational co-operation.

Because of the large and enthusiastic attendance, almost every problem confronting medical societies was discussed, and the meeting provided many suggestions and approaches to a successful and thorough medical public relations program for each society.

This co-operative spirit at the Institute displayed the united front of nationwide medical public relations, and the reported "success stories" were convincing proof that the programs of medical societies were winning the increased understanding and friendship of the public.

Another meeting, keyed to the public relations needs of individual physicians, will be the AMA's Seventh National Medical Public Relations Conference in Miami at the McAllister Hotel, Sunday, November 28—the day preceding the opening of the Clinical Session. All physicians are invited to participate and to learn how their colleagues have improved medical public relations in their home communities.

DEGREES NOW OFFERED IN MEDICAL JOURNALISM

According to an announcement from the American Medical Writers' Association, the first four-year collegiate courses in medical journalism and writing leading to a bachelor's degree will be inaugurated next September at the University of Illinois, Urbana, and the University of Missouri, Columbia. Several partial scholarships ($500 each), sponsored by the American Medical Writers' Association, will be available. Dr. Harold Swanberg, Quincy, Illinois, secretary of the Association, has initiated the fund with a $1,000 contribution to establish one scholarship at each of the schools. Checks for the fund should be made payable to the Association and marked for the Medical Journalism Scholarship fund. Descriptive literature concerning the academic courses may be obtained from Earl F. English, Ph.D., dean, School of Journalism, University of Missouri, Columbia, and I. W. Cole, School of Journalism and Communications, University of Illinois, Urbana. (JAMA, 155:499, May 29, 1954.)

VAN METER PRIZE AWARD

The American Goiter Association again offers the Van Meter Prize Award of $300 and two honorable mentions for the best essays submitted concerning original work on problems related to the thyroid gland. The award will be made at the annual meeting of the Association which will be held in Oklahoma City, Oklahoma, April 28, 29 and 30, 1955, providing essays of sufficient merit are presented in competition.

The competing essays may cover either clinical or research investigations; should not exceed three thousand words in length; must be presented in English, and a typewritten double space copy in duplicate sent to the Secretary, John C. McClintock, M. D., 149½ Washington Avenue, Albany, New York, not later than January 15, 1955.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

The next scheduled examination of the American Board of Obstetrics and Gynecology (Part I), written examination and review of case histories, for all candidates will be held in various cities of the United States, Canada, and military centers outside the continental United States, on Friday, February 4, 1955. For information, candidates may contact Robert L. Faulkner, M. D., secretary, 2105 Adelbert Road, Cleveland 6, Ohio.

NATIONAL SOCIETY FOR CRIPPLED CHILDREN

Keynoting the 31st convention of the National Society for Crippled Children and Adults will be a speech by John F. Kennedy, junior U. S. Senator from Massachusetts, on the topic "Rehabilitation, Your Job and Mine." The convention will be held November 2-5 at the Statler Hotel in Boston, Massachusetts.

The convention theme, "Rehabilitation for Independence," will feature objectives of the Easter Seal Society campaign. Presiding will be National Society president J. Raymond Tiffany. A. L. M. Wiggins, Atlantic Coast Line Railroad chairman of the board, will talk to Easter Seal volunteers at a special luncheon.

Featured on the program will be: Mrs. Ivy Baker Priest, treasurer of the United States; Margaret Mead, Ph.D., noted anthropologist; Romaine Mackie, Ph.D., U. S. Office of Education, chief of the section on exceptional children and youth; Dr. Howard A. Rusk, medical director of the Institute of Physical Medicine and Rehabilitation, New York University—Bellevue Medical Center; Dr. William C. Menninger, general secretary of the Menninger Foundation; Basil O'Connor, president of the National Foundation for Infantile Paralysis; Dr. Augustus Thorndike, president of the Bay State Medical Rehabilitation Clinic; and, Dr. William T. Green, orthopedic surgeon and chairman of the Joint Committee on the Public Care of Crippled Children, Boston.

SECTIONAL MEETINGS—ACS

Winnipeg, Manitoba, will be the site for the Sectional meeting of the American College of Surgeons, April 25 and 26, 1955. Dr. P. H. T. Thorlakson and committee have announced that the program will include panels, papers and symposia dealing with gastric surgery, cardiac surgery, plasma substitutes, ureteral transplants, surgical lesions of the pancreas, biliary tract surgery, surgical diseases of the spleen, trauma and cancer.

Winnipeg speakers, as well as the following out-of-town authorities, will be featured: Earl A. Connolly, M. D., Omaha, Nebraska; Richard L. Varco and W. Robert Schmidt, Minneapolis; J. C. Evans, Rochester; Stanley O. Hoerr, Cleveland, Ohio; Thomas S. Wilson and Walter MacKenzie, Edmonton, Canada; R. A. Mustard, Toronto, Canada; and, Clayton H. Crosby, Regina, Canada.

For further information, physicians may contact Dr. H. Prather Saunders, Associate Director, American College of Surgeons, 40 East Erie Street, Chicago 11, Illinois.

CHEST RADIOGRAPHS AVAILABLE FROM HEALTH DEPARTMENT FILES

Dr. L. G. Rigler has recently pointed out that chest x-ray pictures taken even years before ultimate diagnosis of lung cancer in a patient may frequently show suggestive shadows when studied in retrospect. Many doctors have emphasized the value of comparison of previous chest radiographs in deciding on the significance of more recently discovered shadows.

The Minnesota Department of Health has available in its Tuberculosis Control Unit, approximately 1,400,000 chest x-ray pictures of Minnesota residents who had examinations made by the three mobile x-ray units operated by the Department from 1947 through 1953. These people were examined in surveys carried on in sixty-seven counties in all parts of the state, not including Hennepin or St. Louis Counties. In these two counties, mobile units operated by the respective county Christmas Seal organizations x-rayed many additional thousands of residents.

The registration cards which identify the x-ray films available from the Department have been arranged by county of survey and alphabetically by first letter of the name. The films are 70 millimeter photofluorograms in rolls of 350 pictures. Each satisfactory film bears a survey and x-ray number which is duplicated on the registration card, where additional data as to name, age, sex, address, date of film, and name of personal physician are recorded. Persons of school age and up were routinely included in the surveys. The great majority of the films were interpreted as negative. For any persons whose 70 millimeter films suggested pulmonary shadows, 14x17 inch chest x-rays were routinely done by the mobile unit; these larger radiographs customarily were returned to the county at the end of the survey for local disposition.

The Department is glad to make these radiographs available to physicians for their use in studying chest conditions in their patients. The figures suggest that over half of the state's population were x-rayed by the units, and that a radiograph might be available on one of every two persons, other than very young children, who might consult a doctor.

When requesting radiographs, as much information as possible should be sent as to name, age, sex, and place and date of the x-ray, if known. The Department will do its best to locate the radiograph and send it to the doctor.

PHYSICIANS-SCHOOLS MEETING SET

Plans for better school health programs for Minnesota will be discussed by physicians, dentists and school administrators at the first conference on Physicians and Schools, to be held December 2 and 3, 1954. The meeting, a follow-up of the American Medical Association's national conference on Physicians and Schools, will be held at the University of Minnesota Center for Continuation Study, Minneapolis.

The program will be sponsored by the Minnesota State Medical and Dental Associations, the School Administrators' Association and the Minnesota State Departments of Health and Education.

All physicians have been urged to attend the sessions. Tuition will be paid by the Department of Health.

STATE GP ACADEMY

The fourth annual scientific assembly of the Minnesota Academy of General Practice will be held in Rochester, October 20, with about 500 physicians expected to attend.

Thirteen Mayo Clinic staff men will present scien-

tific lectures, and thirty-five scientific exhibits will be displayed. The meeting will be held in Mayo Civic auditorium.

Guest speaker at the noon luncheon meeting will be Dr. Albert M. Snell, former head of a section of internal medicine at the Mayo Clinic, who now is practicing at the Palo Alto, California, clinic. Dr. C. W. Mayo will be master of ceremonies.

Members of the clinic staff who will present scientific papers during the day are Drs. L. A. Brunsting, W. F. Kvale, T. T. Myers, E. A. Banner, P. R. Lipscomb, M. B. Coventry, C. H. Watkins, W. H. ReMine, O. H. Beahrs, J. C. Ivins, L. E. Ward, W. O. Osborne and J. L. Emmett.

General chairman of the meeting is Dr. R. L. Page of St. Charles. Dr. H. A. Wente of Rochester, who is secretary-treasurer of the Minnesota Academy of General Practice, is in charge of local arrangements. President of MAGP is Dr. James A. Cosgriff of Olivia.

MINNESOTA NURSING GROUP

Minnesota League for Nursing announces two regional workshops for instructors in the Twin Cities area. The first at the American Red Cross headquarters, Minneapolis, will be on November 29 and 30; the second at St. John's Hospital, Saint Paul, will be on December 2 and 3. If these are successful, others will be held in other areas of the state. A five-day teacher-training workshop was held November 8-12 with ten teachers from the Twin Cities hospitals in attendance.

NORTHERN MINNESOTA MEDICAL ASSOCIATION

A Bertha physician, Dr. W. W. Will, was elected president of the Northern Minnesota Medical Association at its thirty-fourth annual meeting last month. Other officers include: Dr. Leslie Lundsten of Bemidji, vice-president, and Dr. C. L. Oppegaard of Crookston, secretary-treasurer.

Arrangements for the two-day meeting in Willmar were made by a committee headed by Dr. D. L. Jacobs, convention chairman.

Guest speaker at the convention banquet was Dr. Paul de Kruif of Holland, Michigan, noted scientist-author. Dr. de Kruif talked on hypertension.

Dr. L. H. Rutledge, Detroit Lakes, is retiring president.

SOUTHERN MINNESOTA MEDICAL ASSOCIATION

Highlighting the program of the Southern Minnesota Medical Association's meeting last month at Winona was a speech by Dr. W. C. Bernstein of St. Paul. Dr. Bernstein, retiring president and a member of the association for 25 years, outlined the group's 62 years of medical achievement in a talk at the convention banquet.

Officers elected for 1955 are: Dr. David Anderson, Austin, president; Dr. Walter J. Halloran, Jackson, first vice-president; Dr. Charles Stroebel, Rochester, second vice-president; and, Dr. G. R. Dressner, Rochester, secretary-treasurer.

Medals were awarded Dr. W. O. Finkelnburg, Winona, and Dr. J. D. Sjoding, Mankato, for submitting the best case report and scientific paper, respectively.

Working with Dr. Lewis I. Younger on the arrangements committee were: Dr. Philip Heise, Dr. George Loomis and Dr. Roger Hartwich, all of Winona.

MENTAL HEALTH MEETING HELD IN ROCHESTER

More than 250 legislators, physicians, welfare workers, mental hospital committee members, judges, county commissioners and other representatives of organizations interested in the state mental health program attended a special meeting last month at Rochester State Hospital.

The meeting, which stressed the importance of medical and surgical services and research, was the first in a series of five such regional programs planned to acquaint Minnesotans with the progress and problems in the mental health program. A new research project in Huntington's chorea was also discussed.

Dr. Magnus C. Petersen, superintendent, presided. Speakers included Drs. J. C. Ivins, H. W. Dodge, Jr., R. Royer and O. H. Beahrs of the Mayo Clinic, and Drs. Jorge A. Lazarte and A. H. Sanford and J. S. Pearson, Ph.D., of the state hospital staff. Jarle Leirfallom, commissioner of the department of public welfare, also spoke. The meeting was sponsored jointly by the welfare department and the various state hospitals.

CITY DIABETES SURVEY

Minneapolis, first city to use the Dreypak paper slip method in a citywide diabetes detection survey, will have its fourth mass diabetes check in five years.

The detection drive will be conducted during National Diabetes week—November 14-20.

Dr. Moses Barron is chairman of the Diabetes Association of Greater Minneapolis.

The Dreypak method, which does away with cumbersome bottles or urine specimens, will be even more simple this year than it was in 1952 when Minneapolis used it in a citywide survey.

Agencies co-operating in this year's survey include the Diabetes Association of Greater Minneapolis, Minneapolis health department, Hennepin County Medical society, Minneapolis Jaycees, Hennepin County Tuberculosis association and Twin City Retail Druggists association.

PSYCHOLOGY COURSE SET

Two psychologists from North Carolina and California will return to their alma mater in October to be guest speakers at a University of Minnesota psychology short

course in the University's Center for Continuation Study.

The psychologists are George Welsh, associate professor of clinical psychology at the University of North Carolina, Chapel Hill, and Harrison G. Gough, assistant professor of psychology at the University of California at Berkeley. Both studied clinical psychology at the University of Minnesota.

The course, on the use of the Minnesota Multiphasic Personality Inventory, is planned for Thursday through Saturday, October 14-16, under the direction of Starke R. Hathaway, director of the University's division of clinical psychology and co-deviser of the MMPI. The course is open to psychiatrists and other physicians.

CONTINUATION COURSES

Fractures will be the subject of a continuation course to be presented by the University of Minnesota next November 22 to 24 at the Center for Continuation Study. Intended primarily for physicians engaged in general practice, the program will stress the practical management of the types of fractures most commonly met. Registrants will be invited to bring their own films to a "consultation session." The program will be presented under the direction of Dr. Wallace H. Cole, Professor, Department of Surgery, and Director, Division of Orthopedic Surgery.

NINE HEALTH FACILITIES TO GET HILL-BURTON FUNDS

An estimated $3,415,540 for nine health facilities to be built under the Hill-Burton Hospital Construction Act, was approved by the State Board of Health at its meeting Friday, October 8. Of this amount, $1,464,165 was committed from funds immediately available under Hill-Burton funds. An additional $200,000 was provisionally allotted to three of these projects from money provided under the amendments to the Act, Public Law 482, passed by the 83rd Congress. The amendments provide for the construction of specialized and related hospital facilities, including chronic hospitals, diagnostic or treatment centers, rehabilitation facilities and nursing homes.

Total cost of the nine facilities is estimated to be $8,350,394.

Two of the projects are for Minneapolis facilities, including the Minneapolis Public Health Center, for which the estimated federal portion will be $970,202 from Hill-Burton and amendment money to be split over a three-year period. The other project is for a combined chronic and psychiatric unit to be added to Fairview Hospital, totalling $423,675, split over a two-year period.

This is the first time that Hill-Burton money has been used to assist in the construction of any Minneapolis project, with the exception of three projects on the University of Minnesota campus, according to Dr. R. N. Barr, deputy officer of health, and Dr. Helen Knudsen, chief of the section of hospital services.

Other projects include a Public Health Center for St. Paul, for which the total federal share is estimated to be $405,891, from Hill-Burton and amendment money spread over the next two or three years.

Hospitals for four communities in the general hospital category "Priority A" group were approved. These include Long Prairie, $204,545; Paynesville, $163,620; Cambridge, $180,000; Two Harbors, $270,000.

Included in the allotment is $346,000 of Hill-Burton money for a regional hospital in Fergus Falls, the remainder of a split project from last year. It is estimated that the total cost of this hospital will be slightly more than one million dollars, with the total federal share $450,405.

A second regional hospital to be located at Willmar was approved by the Board. The total cost of the Willmar Hospital is an estimated $771,560, with the federal share of $347,202. Only $150,000 will be available this year on the split-project basis. Sponsoring agents of split projects must underwrite the federal portion, which is not currently available.

The review of projects under construction or scheduled over the next three-year period in Minnesota indicates that total construction for health facilities will exceed 65 million dollars.

The projects authorized by the State Board of Health had been previously recommended by the State Advisory Council on Hospital Construction. Amounts received from federal funds represent 45 per cent of the total cost of construction and equipment. The cost of the building site for public health centers is eligible for federal participation.

At the present time, amendment money for assistance in the construction of the specialized facilities is not available. As in the original Hill-Burton plan, states must survey needs and develop a state plan before funds can be specifically appropriated for chronic disease hospitals, diagnostic or treatment centers, rehabilitation facilities and nursing homes, according to Dr. Knudsen. It is expected that this preliminary work will be completed sometime after January 1, 1955.

THE PHYSICIAN AND HIS TAXES

(Continued from page 768)

incurred, is the virtually absolute necessity for integrating your program of property disposition and future protection for your family into what is known as an estate plan.

This estate plan may be relatively simple or it may be fairly detailed and complex depending on the size of your property holdings and the number and station in life of those whom you intend to receive your property. But whether simple or complex, the plan cannot have life unless you take time to create it and then assure its completion by executing a Will that is tailor-made to your particular needs.

The meeting was adjourned.

ROBERT E. PRIEST, M.D.,
Secretary

Woman's Auxiliary

RAMSEY COUNTY WOMEN ACTIVE

The Philanthropic Fund of the Woman's Auxiliary to the Ramsey County Medical Society benefited substantially from the annual Fall Fashion Festival which highlighted early fall activities of the Ramsey group. The festival was presented by Schuneman's and held at the Hotel Saint Paul. Mrs. M. Dudley Hilker of Saint Paul was general chairman for the affair.

All activities of the auxiliary for the 1954-1955 season were discussed and plans outlined at a Board meeting held August 23 at the home of Mrs. W. P. Gardner, president. Committee chairmen were briefed for the year at this meeting.

A large representation from the Ramsey Auxiliary attended the annual School of Instruction of the Woman's Auxiliary to the Minnesota State Medical Association also. This program of instruction for all auxiliary members was held October 1 at the Hotel Curtis in Minneapolis with Mrs. George Turner of El Paso, Texas, president of the Woman's Auxiliary to the American Medical Association, as one of the principal speakers.

STATE AUXILIARY ANNUAL MEETING

Doctors' wives from all over Minnesota attended the 32nd Annual Meeting of the Woman's Auxiliary to the Minnesota State Medical Association which which opened with the usual pre-convention Board meeting and luncheon, Monday, June 7, at the Kitchi Gammi Club. Tea for all visiting women followed in the afternoon at the Tweed Art Galleries, courtesy of the University of Minnesota Art Department, Duluth Branch, with the St. Louis County Auxiliary as host.

Among important actions taken at the annual meeting and luncheon, Tuesday, June 8, at the Hotel Duluth, were the following:

A gift of $100 was voted for the American Medical Education Foundation.

Purchase of $700 worth of films on health was voted. The films will be presented to the Minnesota Department of Health for distribution.

Mrs. Ernest M. Hammes, Sr., of St. Paul reported the purchase of two conference tables and a bronze plaque, all to be inscribed as gifts of the Woman's Auxiliary and all to be placed in the William A. O'Brien Memorial Seminar Room in the Mayo Memorial Medical Center at the University of Minnesota.

The program included a talk by Mrs. C. N. Pearson, Baraboo, Wisconsin, president of the Woman's Auxiliary to the State Medical Society of Wisconsin, on "Nurse Recruitment" and an address by Dr. Edward B. Shaw of San Francisco on "Community Responsibility for the Immunization Program." An impressive In Memoriam Service for deceased members was conducted by Mrs. John S. Milton, Minneapolis.

A rising vote of thanks to Mrs. Henry W. Quist of Minneapolis, retiring president, accompanied installation of new officers for 1954-55. They are:

President—Mrs. Peter S. Rudie, Duluth
President-elect—Mrs. H. H. Fesler, Saint Paul
First Vice President—Mrs. John Dordal, Sacred Heart
Second Vice President—Mrs. Virgil J. Schwartz, Minneapolis
Third Vice President—Mrs. L. P. Howell, Rochester
Fourth Vice President—Mrs. Justus Ohage, Saint Paul
Recording Secretary—Mrs. David J. Halpern, Brewster
Corresponding Secretary—Mrs. S. N. Litman, Duluth
Treasurer—Mrs. Charles W. Froats, Saint Paul
Auditor—Mrs. G. H. Goehrs, Saint Cloud

The luncheon program was featured, also, by a style show presented by Freimuth Department Store of Duluth.

A Round-up Breakfast, at which all visitors were guests again of the St. Louis County Auxiliary, concluded the program Wednesday at the Duluth Women's Club. All doctors' wives who attended gained valuable information to take back to their local auxiliaries and all were grateful to the committee and hosts who helped to make it a successful meeting.

Mrs. David J. Halpern
Recording Secretary

Communication

Arthur H. Wells, M. D.
Editor, Minnesota Medicine
915 East 1st Street
Duluth, Minnesota

Dear Dr. Wells:

I thought your Journal would be interested to learn that the Hamm Memorial Psychiatric Clinic was officially opened on July 1 of this year. As you may recall, the Clinic was established upon the recommendation of a citizen's committee appointed by the St. Paul Area of Public Health Council. The Clinic is financed by the Hamm Foundation.

Our initial professional staff has been appointed and consists of a director, two psychiatric social workers and a clinical psychologist, as follows:

Mrs. Phillippa H. Eggleston, B.A., M.S., is chief psychatric social worker and Rosabelle Snahr, B.A., M.S., serves as psychiatric social worker. Murray S. Stopol, M.A., Ph.D., is clinical psychologist for the clinic.

Thanking you for your past co-operation, I am

Sincerely yours,
Clarence J. Rowe, M. D.

Saint Paul, Minn.
August 25, 1954

Of General Interest

Six Minneapolis heart specialists, members of the Minnesota Heart Association board of directors, took part in the Second World Congress of Cardiology and the 27th scientific sessions of the American Heart Association last month in Washington. They were **Ancel Keys, Ph.D.,** and **Drs. John J. Boehrer, Maurice B. Visscher, Lewis Thomas, Richard L. Varco** and **Henry L. Taylor,** all of Minneapolis.

* * *

On hand for the 100-mile stock car races during the State Fair was **Dr. C. E. Sutton,** ninety-three, of Minneapolis, the man who won the first auto race staged on the Minnesota Fair track. Dr. Sutton, who served as official starter at this year's event, won the 1908 race in a Locomobile streamer. In 1910 he was starter at the first races to be held in conjunction with the Fair. Dr. Sutton has practiced medicine for sixty-five years.

* * *

Dr. M. D. Starekow of Thief River Falls has been appointed examining surgeon for the Winnipeg division of the Soo Line, it has been announced. Dr. Starekow succeeds Dr. Edward Bratrud. **Dr. Dan Greene** was named Thief River Falls surgeon for the Soo Line, succeeding the late Dr. O. F. Mellby and Dr. Theodor Bratrud, now of Minneapolis. Both appointments were made by **Dr. Harvey Nelson** of Minneapolis, chief surgeon for the railroad.

* * *

Off on a two-month business and pleasure tour of Europe, Africa and the Near East is **Dr. Marie K. Bepko** of Cloquet. Dr. Bepko will attend the Seventh Congress of the Medical Women's Internation Association at Gardone, Lake Garda, Italy, and participate in an international tour arranged from members including stops in Portugal, Algieria, Spain and Italy. In Rome, Dr. Bepko will attend the Assembly of the World Medical Association. Before returning to Cloquet, she will visit Lebanon, Syria, Israel and Jordan.

* * *

Dr. and Mrs. Arthur M. Olsen of Rochester are touring the Scandinavian countries on the first leg of a two-month European trip. The Olsens will also visit France, Switzerland, Italy, Spain and Portugal. A member of the Mayo Clinic staff, Dr. Olsen will present papers at the Third International Congress of Diseases of the Chest in Barcelona, Spain, and at the Third International Congress of the Broncho-Esophagological Society in Lisbon, Portugal. The couple will return to Rochester the latter part of October.

* * *

Doctors and wives of the Range Medical Society and Auxiliary were entertained for their annual summer meeting at the home of **Dr. W. C. Heiam** of Cook..

Dr. Gerald S. Buchanan of the Deer River Hospital Clinic Staff has received notice to report for duty with the Army Medical corps at Fort Sam Houston, Texas. Dr. Buchanan has been given the rank of Captain.

* * *

Residing in Rochester are **Dr. and Mrs. Victor Hugo Gardner,** who were married recently in Fairmont. The bride is the former Dolores Randall, daughter of Dr. and Mrs. Selby Wetmore, St. John's, New Brunswick, Canada. Dr. Gardner, son of Dr. and Mrs. V. H. Gardner of Fairmont, is a fellow in orthopedic surgery at the Mayo Clinic.

* * *

Speaker at a dinner meeting of the Sister Elizabeth Kenny Foundation fund appeal volunteers was **Dr. Paul M. Ellwood,** director of in-patient service at Kenny Institute, Minneapolis. The meeting was part of an all-day rally of Wisconsin, Iowa and Minnesota county fund appeal chairmen held last month at the Nicollet hotel.

* * *

Guest speaker September 21 at a meeting of the Blackhawk County Medical Society, Waterloo, Iowa, was **Dr. Hamlin Mattson** of Minneapolis. Dr. Mattson spoke on the topic "Surgery of the Peptic Ulcer."

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Dr. William R. Tucker, chief of the tuberculosis service at Veterans Hospital for seven years, left the Minneapolis post to become chief of the pulmonary disease service of the Veterans Hospital at Durham, North Carolina. Dr. Tucker assumed his new duties last month. He is also a member of the Duke University School of Medicine faculty at Durham. Dr. Tucker is succeeded in Minneapolis by **Dr. William W. Stead.**

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Visiting an old friend in Minneapolis, **Dr. John F. Briggs,** last month was one of England's leading authorities on heart disease, **Dr. Geoffrey Bourne.** Dr. Bourne, who is director of cardiology at St. Bartholomew's Hospital and Medical School of London, is a specialist in hypertension. During his stay here he spoke at a staff meeting at St. Joseph's Hospital and visited Variety Club Heart Hospital and the Ancker Research Center.

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Guest speaker for a five-county Christmas Seal dinner last month at Morris was **Dr. Kathleen Jordan** of Riverside Sanatorium, Granite Falls. Dr. Jordan is field physician for the state Christmas Seal organization. Counties participating in the workshop and dinner meeting were Pope, Big Stone, Traverse, Stevens and Swift.

Dr. Charles W. Mayo of Rochester was honored last month when he was one of four men given honorary fellowships by the American College of Hospital Administrators. The group met in Chicago.

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Benefits polio victims have received from Sister Elizabeth Kenny treatments were reviewed by **Dr. Miland E. Knapp,** Minneapolis, at the September meeting of the American Congress of Physical Medicine. Dr. Knapp, chief of physical medicine at the Kenny Institute, praised the Kenny method of treatment in a paper prepared for delivery at the meeting in Washington, D. C.

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Dr. Robert Priest has been named new president of the Northwestern Hospital medical staff. **Dr. Richard Horns** will be vice president with **Dr. Richard Reiley** as secretary-treasurer. Past president of the group is **Dr. R. E. Hultkrans.**

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Second prize winner in the Foundation of the American Society of Plastic and Reconstructive Surgery scholarship contest was **Dr. A. M. Struthers** of Rochester. Dr. Charles Horton of Duke University, Durham, North Carolina took first place. The winning reports were presented at the society's October meeting in Hollywood, Florida.

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In recognition of his profession contribution to the community, **Dr. E. J. Huenekens,** Minneapolis pediatrician, was awarded the St. Barnabas Bowl in a ceremony at the Cathedral of St. Mark. The silver bowl is an annual award by the board of trustees of St. Barnabas Hospital to a doctor selected by the Hennepin County Medical Society. Previous winners of the bowl were Dr. S. Marx White in 1952 and Dr. Henry L. Ulrich, 1953. Dr. Huenekens also received the 1954 distinguished service certificate of the Community Chest and Council.

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Dr. James A. Johnson of Minneapolis was re-elected president of the Hennepin county district, Minnesota division, American Cancer Society, at a recent meeting of the group. Dr. Johnson has served in this position since 1944.

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Dr. Lawrence M. Randall, chairman of the Mayo Clinic sections on obstetrics and gynecology, has been named president-elect of the American Association of Obstetricians and Gynecologists. Dr. Randall, a Mayo Foundation professor, joined the Clinic in 1924. His election took place at the association's annual meeting at Hot Springs, Virginia.

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A total of $405,456 has been donated to the 1954 American Cancer Society fund drive by Minnesotans, **Dr. David P. Anderson,** Austin, state president, has announced. Goal for the drive was $354,000.

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On a six-week trip to Europe are **Dr. and Mrs. T. B. Magath** of Rochester. In Madrid, Spain, Dr. Magath, chairman of the sections of clinical pathology and biochemistry at the Mayo Clinic, will deliver a paper at the International Congress of Hydatid Disease. The Magaths will tour Spain and visit France, Portugal and England before returning home.

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Guest speaker at the first fall meeting of the Scott County (Iowa) Medical association at Davenport, Iowa was **Dr. Tague C. Chisholm,** Minneapolis. "Emergency Surgery in Infants" was his speech topic.

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Three Pipestone physicians, **Dr. R. W. Keyes, Dr. R. J. Kotval** and **Dr. W. G. Benjamin,** took part in the first of a series of medical seminars held last month in Slayton. Other seminars followed the initial meeting, which was sponsored by the University of Minnesota and the Minnesota State Medical Association.

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The following physicians have recently completed Fellowships or terminated their periods of assignment at Mayo Clinic, Rochester: **R. M. Akey, J. J. Antel, J. A. Benson, Jr., J. T. Brandenburg, H. D. Breidahl, L. T. Brown, T. A. Burcham, Jr., R. J. Burleson, Edward Cutler, R. A. Dobson, P. L. Eichman, Luis Fernandez-Herlihy, C. C. Henderson, William Hunt, A. L. Karavitis, Andrew Helen, R. G. Khayat, K. S. Kim, R. H. Livingstone, Mary J. MacDonald, K. L. Morris, S. S. Morrison, L. S. O'Holleran, J. E. Osborne, M. B. Oxford, E. W. Parry, M. A. Peters, R. A. Rabens, M. G. Ringer, Jr., H. M. Roberts, A. G. Rogers, J. T. Shepherd, L. R. Smith, H. J. C. Swan, J. C. Tarantino, T. M. Terpinas, Richard Thors, F. A. Ubel, Jr., Geoffrey Watkinson, J. A. Witt, W. W. Wood and Eileen E. Zeitler.**

Going on military leaves of absence are **Drs. J. D. Bonnet, N. L. Cadman, A. R. W. Climie, A, B. Gould, Jr., R. E. McCaslin, Jr., R. A. Peake, G. J. Petropoulos, H. J. Schultz, H. J. Semler and A. W. Silver.**

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Dr. L. J. Swanson, St. Paul, has returned from a two-year tour with the U.S. Air Force, and will open his civilian practice at 950 South Robert Street.

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Dr. W. P. Eder, Minneapolis, has announced the opening of new offices at 1629 Medical Arts Building, Minneapolis. He will specialize in the practice of surgery. Dr. Eder has been surgical resident at General Hospital the past two years.

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Dr. C. J. Henry and **Dr. M. W. Johnson** of Milaca will open offices in St. Cloud, it has been announced. The physicians will locate in the Foley Hardware Building.

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New operative techniques in obstetrics and gynecology were reviewed when **Dr. A. O. Swenson,** Duluth, president-elect of the Minnesota State Medical Society, spoke to members of the Southwestern

Medical Society at Worthington. The meeting was one of three to be held in Worthington, with the annual meeting set for Pipestone.

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Dr. John F. Pohl, Minneapolis orthopedic surgeon at the Micheal Dowling School of Crippled Children, spoke at a regular meeting of United Cerebral Palsy of Duluth. His topic was "Orthopedic Management of Cerebral Palsy."

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Dr. John J. Beer, chairman of the Medical Advisory Committee for the St. Paul Rehabilitation Center, which is appointed by the Ramsey County Medical Society, announces the appointment of the following supervisory staff at the Rehabilitation Center: Donna Pauley, R.P.T.; Mrs. Mary Alice Frawley, O.T.R.; and Eleanor Swanson, M.A., Speech Therapy.

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Dr. J. S. Blumenthal, clinical associate professor of medical and chief, Allergy Clinic of the University of Minnesota, addressed the Glen Lake staff recently on the subject "Skin Tests in Allergy—Their Values and Limitations." He also spoke on "Allergy and the Need of Research in this Field" at the Oak Park Home auxiliary, Minneapolis.

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Dr. Waltman Walters, Rochester surgeon, has been honored as recipient of the 1954 Honor Award given by the Mississippi Valley Medical Society. Dr. Walters is professor of surgery, Mayo Foundation, University of Minnesota, and chief editor, AMA Archives of Surgery and the Lewis-Walters practice of surgery. The Honor Award is given from time to time to non-members of the Society "who have made distinguished contributions to clinical medicine," the Society announced.

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Dr. J. Arthur Myers, chief of the University of Minnesota Chest Clinic, was speaker at the annual McLeod County public health dinner held in Winsted. His topic was "Hunting the Tubercle Bacillus." Dr. Myers also presented Tuberculosis accreditation awards to county commissioners and to school superintendents in McLeod county.

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Dr. Viktor O. Wilson of Rochester, Olmsted county public health officer, and **Dr. Ralph Paffenbarger,** epidermiologist with the poliomyelitis laboratory of Johns Hopkins University, Baltimore, are working together on a new study of the 1952 polio outbreak in the county. The study is designed to determine if either prior removal of tonsils or presence of pregnancy increases risk of contracting paralytic polio.

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Dr. Ezra V. Bridge, superintendent of Mineral Springs sanatorium, was the main speaker at a district Christmas Seal workshop recently in Austin. Counties represented were Faribault, Freeborn and Mower.

Senior medical officer at Red Lake Indian hospital for the past six years, **Dr. Herman Kleinman,** is registered for a year's study at the University of Minnesota. He will receive a public health degree, returning to Red Lake in June.

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Representatives of five counties in southeastern Minnesota attended the district Christmas Seal Workshop in Rochester. Speakers on a question- and-answer panel at the noon luncheon meeting were **Dr. Ezra V. Bridges,** superintendent of Mineral Springs sanatorium; **Dr. David Carr** and **Dr. Bruce Douglass** of the Mayo Clinic, and **Dr. Viktor O. Wilson,** Rochester-Olmsted county public health officer. **Dr. Tom Mulrooney,** state TB field representative, was moderator and **Dr. H. Z. Giffin** of Rochester, Olmsted county Tuberculosis and Health Association president, presided.

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Dr. Richard M. Hewitt, Rochester medical writer and editor, was recipient of the 1954 Distinguished Service Award given by the American Medical Writers' Association. Dr. Hewitt is the senior consultant Section on Publications, Mayo Clinic; assistant professor of Medical Literature, Mayo Foundation, University of Minnesota; former assistant editor, JAMA. Dr. Hewitt has served as chairman of the Education committee of the American Medical Writers' Association since it was organized in 1951 and is largely responsible for the establishment of the new four-year courses in medical journalism and writing at the University of Illinois and the University of Missouri.

Dr. Hewitt was also awarded a Fellowship in the American Medical Writers' Association by the President of the Association at the banquet held on the eleventh annual meeting of the Association in Chicago. These fellowships are given "in recognition of high qualifications, personal and professional, and of established standing as a medical writer, journalist or publisher."

NEW LOCATIONS

Dr. Earl V. Wetzel, who has recently completed a three years' residency in obstetrics and gynecology at Ancker Hospital, has become associated with Dr. Jane E. Hodgson, St. Paul. Dr. Wetzel was previously in general practice in St. Cloud for five years.

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Just returned from overseas service with the Navy is **Dr. William H. Card,** who has moved into the office of the late Dr. William J. Noonan in the Minneapolis Medical Arts building. Dr. Card, who served with the Navy for two years, will practice urology.

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Dr. John Verby, a member of the Rochester baseball team in 1947, has returned to that town to join Drs. H. A. Wente and James Doyle in their medical practice. A graduate of Carleton College and the University of Minnesota School of Medicine, Dr. Verby served both with the Navy in World War II and with the Army Medical corps in Korea.

Now practicing in Bricelyn is **Dr. Elbert Gamble,** who has completed a year's residency in psychiatry at the Hastings State Hospital. Dr. Gamble, a native of Albert Lea, was graduated from the University of Minnesota Medical School in 1952, and served his internship at Ancker Hospital.

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Dr. T. G. Rollins, formerly of Hoopa, California, is now associated with Dr. Sidney Finkelstein at the Chippewa Hospital, Cass Lake. Dr. Rollins will be senior assistant surgeon of the United States Public Health Service.

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Opening new offices in St. Cloud is **Dr. Everett J. Schmitz,** who will limit his practice to general and thoracic surgery.

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Dr. George Friedell will leave his practice at Ivanhoe to become a member of the staff of Mount Sinai Hospital, Minneapolis. He will open offices in St. Louis Park.

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Dr. Richard P. Groschupf has joined the staff of the Bemidji Clinic as a general practitioner. He is the son of Dr. and Mrs. T. P. Groschupf of Bemidji, and a medical graduate of Creighton University in Omaha. He interned at St. Mary's hospital, Duluth.

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Dr. G. W. Schossow, a North Dakotan, has moved into Erskine's new clinic and has begun practicing. Dr. Schossow is a graduate of the University of Nebraska, and did his internship at St. Luke's Hospital, Fargo.

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Dr. Charles J. Hedlund, formerly of Northfield, has taken over the practice in Owatonna of **Dr. R. J. Wilkowske.**

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Dr. Newton D. Smith, a member of the Mayo Clinic staff since 1929, and an associate professor of proctology in the Mayo Foundation, will leave the clinic to practice proctology at Fort Worth, Texas.

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Dr. John Pone, a graduate of the Universities of Latvia and Munich, Germany, has joined **Dr. K. A. March** in his practice at Cambridge. Dr. Pone practiced in Bavaria from 1929 to 1948, and was licensed in Minnesota in 1952.

MINNESOTA BLUE CROSS-BLUE SHIELD

From an analysis of Blue Shield data for the first six months of each of the year 1953 and 1954, it is found that the cost of claims, the number of services paid, the average number of claims per month, together with the average cost per claim, have increased for this period in 1954 as compared with that of 1953.

During the first six months of 1953, claims cost amounted to $2,188,888, whereas for the first six months of 1954, payment of claims amounted to $2,465,876. From these figures it is apparent that $276,988 more was paid for claims for the first six months of 1954 than during the same period of 1953.

For the first six months of 1953, 69,650 claims for Blue Shield benefits were received. During the same period in 1954, 77,471 claims for benefits were processed. It can be seen that the increase of approximately 1,300 claims per month, if projected over the entire year, indicates that as many as 15,000 more claims may be received in 1954 than in 1953.

An additional factor of interest is that the average cost per Blue Shield claim has also increased. During the first six months in 1953 the average cost per service was $29.11. For the first six months in 1954 an increase to $30.19 per service was realized. The increase is most marked in cases of obstetrical and medical services.

During the first six months of 1954, 7,688 participant subscribers were enrolled in Blue Shield bringing the net enrollment as of June 30, 1954, to 635,130 participant subscribers.

During the first seven months of 1954, 93,268 participant subscribers were enrolled in Blue Cross. Including cancellations the net enrollment as of July 31, 1954 was 1,006,537 participant subscribers.

A total of $10,319,273 was provided for hospitalization of Blue Cross participant subscribers, an increase of $1,650,415 over the same period last year.

BOOK REVIEWS

Books listed here become the property of the Ramsey, Hennepin and St. Louis County Medical Libraries when reviewed. Members, however, are urged to write reviews of any or every recent book which may be of interest to physicians.

CLINICAL APPLICATIONS OF SUGGESTION AND HYPNOSIS. William T. Heron, M.A., Ph.D., Professor of Psychology, University of Minnesota, Minneapolis, Minnesota. 2d ed. 137 pages. Price $3.75. Springfield, Ill.: Charles C Thomas, 1953.

The second edition of this small monograph gives a succinct and practical presentation of its subject. From the study of this book alone, most practitioners will not feel competent to use hypnosis, but they will appreciate much better what it has to offer. In addition, the part that suggestion plays in the practice of medicine is made more clear.

D.M.C.

DIRECTORY OF PROFESSIONAL MOTION PICTURE FILMS AND AUTHORS. Compilation of information on nearly 3,000 films, 1,000 authors. 336 pages. Lawrence, Kansas: Professional Publications, 1954. Price $7.50.

This Directory of Professional Motion Picture Films and Authors is announced as the only comprehensive, classified, modern reference book on professional motion picture films and their authors. It enables educators to locate, evaluate, select and procure suitable films with a minimum of time and effort.

Handsomely bound, the Directory gives descriptive information concerning both films and authors, with special sections on appropriate films for training hospital personnel and educating lay groups.

Copies are available upon approval from the publishers, Professional Publications, 2010 Kentucky Street, Lawrence, Kansas.